

QUARANTINE.

BY

WALTER WYMAN, M.D.,

SURGEON-GENERAL U. S. MARINE-HOSPITAL SERVICE.

REPRINT OF CHAPTER XXIII

DR. GEO. H. ROHÉ'S "TEXT-BOOK OF HYGIENE."

*Third Edition ; Thoroughly Revised and Largely Rewritten,
with many Illustrations and Valuable Tables.*

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CHAPTER XXIII.

QUARANTINE.

(By WALTER WYMAN, M.D., Surgeon-General United States Marine-Hospital Service, and H. D. GEDDINGS, M.D., Passed Assistant Surgeon Marine-Hospital Service.)

By quarantine is meant the adoption of restrictive measures to prevent the introduction of diseases from one country or locality into another. The term itself conveys no definite idea, being derived through the Italian from the Latin "quadraginta," meaning "forty" and implying forty days,—the period of detention imposed on vessels by the first quarantines established at Venice in 1403. The old significance of the term is entirely lost in its present application, which is quite general. Thus, besides regular maritime quarantine, mention is often made of land, railroad, cattle, shot-gun, house, and even room quarantines.

The name of a disease or article of merchandise may be used in prefix, as in "yellow-fever quarantine," small-pox, cholera, or rag quarantine. Moreover, quarantines are described as properly beginning at the port of departure, and as quarantines of inspection only, the fumigation and detention being imposed at some neighboring station. The term, therefore, is applied not only to establishments, but indifferently to persons, animals, diseases, localities, and measures.

There is need of a clear understanding with regard to the term, for when, as occasionally, quarantine is ridiculed, or the assertion is made that the English disbelieve in quarantine, a wrong impression will be received, unless it is understood that only particular and obsolete forms of quarantine are meant, and not quarantine in the broad sense just mentioned.

The subject admits of two natural divisions—maritime and land quarantine; but before describing them attention is called to the following table, containing a list of diseases that are ordinarily found in official quarantine proclamations:—

TABLE XXXII.
QUARANTINABLE DISEASES.

DISEASE.	PERIOD OF INCUBATION, IN DAYS.			
	Shortest.	Longest.	Usual.	Authority and Remarks.
Plague	3	8	3 to 5	Kitisato.
Yellow fever	1	11	2½	Da Costa, Bartholow, Geddings.
Cholera	2	14	2 to 4	Bartholow.
Typhus fever	1	21	5 to 14	Bristow.
Small-pox	5	20	10	Da Costa.
Measles	7	14	10	Da Costa.
Diphtheria	2	10	2 to 5	Bartholow.
Typhoid fever	7	28	21	Bartholow.
Scarlet fever	1	weeks.	4 to 7	Da Costa.
Relapsing fever . . .	5	7	6	Bartholow.
Dengue	1	10	5	Bartholow.
Leprosy	..	..		Undetermined.

The above list illustrates the growth of the sanitary idea and belief in quarantine. For many years, as now at some ports, the list was limited to yellow fever, typhus, cholera, and small-pox. It was thus limited at Boston prior to 1881, since which date diphtheria, scarlet fever, typhoid fever, and measles have been added. The statutes of New York define as quarantinable "yellow fever, measles, cholera, typhus or ship fever, small-pox, scarlatina, diphtheria, relapsing fever, and any disease of a contagious, infectious, or pestilential character, which shall be considered by the health officer dangerous to the public health."

At Gibraltar, the English sanitary authorities include dengue and epidemic rose-rash among the diseases subject to their quarantine regulations.

The most recent addition to the list in this country is leprosy, to prevent the introduction of which, and in accordance with a resolution of the American Public Health Association, a prohibitory circular was issued by the Surgeon-General of the Marine-Hospital Service, December 23, 1889.

Other diseases which may properly call for quarantine are mumps, whooping-cough, chicken-pox, epidemic dysentery, glanders, tetanus, beriberi, epidemic influenza, and pulmonary tuberculosis.

Influenza may be considered quarantinable under certain circumstances, a successful quarantine being reported by Dr. Trudeau, whose cottage sanitarium, in the Adirondacks, New York, was thus kept exempt during the epidemic of 1890.

With regard to pulmonary tuberculosis the ground is taken by the writer that this disease, at least among immigrants, should be excluded from the United States by quarantine.

FOREIGN QUARANTINE.

The object of maritime quarantine being protection against the importation of contagious or infectious disease, chiefly from abroad, through the medium of vessels, their crews, passengers, and cargoes, it is most logical that restrictive measures should begin at the port of departure. Following are the regulations prepared by the Supervising Surgeon-General United States Marine-Hospital Service, and promulgated by the Secretary of the Treasury, April 26, 1894. All quarantine regulations are subject to occasional revision under the Act of Congress approved February 15, 1893.

U. S. QUARANTINE REGULATIONS TO BE OBSERVED AT FOREIGN PORTS AND AT SEA.

ARTICLE I.—BILLS OF HEALTH.

Par. 1. Masters of vessels departing from any foreign port for a port in the United States must obtain a bill of health in duplicate, signed by the proper officer or officers of the United States, as provided for by law.

The following form is prescribed:—

Par 2. Bill of health:

Form No. 1931 a.

UNITED STATES BILL OF HEALTH.

Name of vessel, ———. Nationality, ———. Rig, ———. Master, ———. Tonnage, gross, ———; net, ———. Iron or wood. Number of compartments for cargo, ———; for steerage passengers, ———; for crew, ———.
Name of medical officer, ———.

Number of officers, _____.
 Number of crew, including petty officers, _____.
 Number of passengers, cabin, _____.
 Number of passengers, steerage, _____.
 Number of persons on board, all told, _____.
 Port of departure, _____.
 Where last from, _____.
 Number of cases of sickness, and character, during last voyage, _____.
 Vessel engaged in _____ trade, and plies between _____ and _____.
 Sanitary condition of vessel, _____.
 Nature, sanitary history, and condition of cargo, _____.
 Source and wholesomeness of water-supply, _____.
 Source and wholesomeness of food-supply, _____.
 Sanitary history and health of officers and crew, _____.
 Sanitary history and health of passengers, cabin, _____.
 Sanitary history and health of passengers, steerage, _____.
 Sanitary history and condition of their effects, _____.
 Prevailing diseases at port and vicinity, _____.
 Number of cases and deaths from the following-named diseases during the past two

weeks :—

Diseases.	No. of Cases.	No. of Deaths.
Yellow fever.....	_____	_____
Asiatic cholera.....	_____	_____
Cholera nostras, or cholérine.....	_____	_____
Small-pox.....	_____	_____
Typhus.....	_____	_____

Any conditions affecting the public health existing in the port of departure, or vicinity, to be here stated, _____.

I certify that the vessel has complied with the rules and regulations made under the act of February 15, 1893, and that the vessel leaves this port bound _____ for _____, United States of America, via _____.

Given under my hand and seal this _____ day of _____, 189—.

(Signature of consular officer :) _____, _____.

Par. 3. Vessels clearing from a foreign port for any port in the United States, and entering or calling at intermediate ports, must procure at all said ports a supplemental bill of health signed as provided in Article I. If a quarantinable disease has appeared on board the vessel after leaving the original port of departure, or other circumstances presumably render the vessel infected, the supplemental bill of health should be withheld until such sanitary measures have been taken as are necessary.

The following form is prescribed :—

Par. 4 :

SUPPLEMENTAL BILL OF HEALTH.

Port of _____.

Vessel _____, bound from _____ to _____, U. S. A.

Sanitary condition of port : _____.

State diseases prevailing at port and in surrounding country _____.

Number of cases and the deaths from the following-named diseases during the past two weeks :—

Diseases.	No. Cases.	No. Deaths.	Remarks.
			(Any condition affecting the public health existing in the port, to be stated here.)
Yellow fever.....			
Asiatic cholera or cholerae.....			
Small-pox.....			
Typhus.....			

Number and Sanitary Condition of Passengers Taken on at this Port, and Sanitary Condition of Effects.

Cabin, No. ———. Sanitary condition and history ———.

Steorage, No. ———. Sanitary condition and history ———.

(Cancel Form A, B, or C, as the case requires.)

Form.

A.—To the best of my knowledge and belief—

(Form A will be used at intermediate ports where the vessel does not enter or clear.)

B.—I have satisfied myself that—

(Form B will be used at intermediate ports where the vessel enters and clears.)

no quarantinable disease has appeared aboard since leaving ———.

C.—Since leaving ——— the following quarantinable disease has appeared on board ———, and I certify that the necessary sanitary measures have been taken.

I certify also that with reference to the passengers, effects, and cargo, taken on at this port, the vessel has complied with the rules and regulations made under the act of February 15, 1893.

Given under my hand and seal this ——— day of ———, 189—.

(Signature of consular officer:) ———, ———.

ARTICLE II.—INSPECTION.

Par. 1. The officer issuing the bill of health will satisfy himself, by inspection if necessary, that the conditions certified to therein are true.

Par. 2. Inspection is required of—

(a) All vessels from ports at which cholera prevails, or at which yellow fever, small-pox, or typhus fever prevails in epidemic form.

(b) All vessels carrying steerage passengers.

But the inspection of this class may be limited to said passengers and their living-apartments, if from a healthy port.

Par. 3. Inspection of the vessel is such an examination of the vessel, cargo, passengers, crew, personal effects of same, and including examination of manifests and other papers, food- and water- supply, as will enable him to determine if these regulations have been complied with.

Par. 4. When an inspection is required, it should be made by daylight, as late as practicable before sailing. The vessel should be inspected before the passengers go aboard; the passengers just before embarkation, and the crew on deck; and no cargo or person should be allowed to come aboard after such inspection except by permission of the officer issuing the bill of health.

ARTICLE III.—REQUIREMENTS WITH REGARD TO VESSELS.

Par. 1. Vessels, prior to stowing cargo or receiving passengers, shall be mechanically clean in all parts, especially the hold, forecastle, and steerage; the bilges and limbers free from odor and deposit. The air-streaks should be sufficient in number and open for ventilation. Disinfection of the vessel may be required by the medical officer of the United States.

Par. 2. If any infectious disease has occurred during the last voyage, the portions of the vessel liable to have been infected should be disinfected. When required, this should be done by one of the methods hereinafter described.

Par. 3. The air-space and ventilation must conform to the provisions of the act of Congress approved August 2, 1882, entitled, "An act to regulate the carriage of passengers by sea."¹

Par. 4. The food- and water- supply should be sufficient, and water for drinking purposes, free from possibility of pollution, should be easily accessible.

Par. 5. Vessels departing from a port where cholera prevails should have two medical officers, if more than 250 steerage passengers are carried.

Par. 6. All bedding provided for steerage passengers must be destroyed or disinfected before being again used or landed, and mattresses and pillows used by steerage passengers shall not be landed.

Par. 7. The hospitals of vessels carrying steerage passengers should be located on the upper or second deck, and not in direct communication with any steerage compartment.

Par. 8. Excepting when absolutely required, no solid partitions should be placed in any steerage compartment, obstructing light and air.

ARTICLE IV.—CARGO.

Par. 1. At ports infected with cholera, earth, sand, loam, soft or porous rock should not be taken as ballast. Nor, at ports infected with yellow fever, should such ballast be allowed on board vessels clearing for ports south of the southern boundary of Maryland, when better material, such as hard rock, is obtainable, or when it is possible to use water ballast.

Par. 2. Certain food-products, namely, unsalted meats, sausages, dressed poultry, dried and smoked meats, rennets, fresh butter, fresh milk (unsterilized), fresh cheese, fresh bread, fresh vegetables, coming

¹ Computation of air-space in any steerage compartment must not include the space taken up by bunks, mattresses, life-preservers, or personal effects.

from cholera-infected localities, or through such localities, if exposed to infection therein, should not be shipped.

Par. 3. Fresh fruits from districts where cholera prevails shall be shipped only under such sanitary supervision as will enable the inspector to certify that they have not been exposed to infection.

Par. 4. Articles of merchandise, personal effects, and bedding, coming from a district known to be infected, or as to the origin of which no positive evidence can be obtained, and which the consular or medical officer has reason to believe are infected, should be subjected to disinfection prior to shipment by processes prescribed for articles according to their class.

Par. 5. New merchandise in general may be accepted for shipment without question; and articles of new merchandise, textile fabrics, and the like, which have been packed or prepared for shipment in an infected port or place, with a special view to protect the same from moisture incident to the voyage, may be accepted and exempted from disinfection.

Par. 6. All rags and all textile fabrics used in the manufacture of paper, collected or packed in any foreign port or place, must, prior to shipment to the United States, be subjected to disinfection by one of the prescribed methods:—

(Old jute bags, old cotton bags, old rope, new cotton and linen cuttings from factories not included.)

Par. 7. Rags, old jute, old gunny, old rope, and similar articles, gathered or packed or handled in any port or place where cholera or yellow fever prevails, or small-pox or typhus fever prevails in epidemic form, should not be shipped until the officer issuing the bill of health shall be satisfied that the port or place has been for thirty days free from such infection, and after the disinfection of the articles.

Par. 8. New feathers for bedding; human and other hair, unmanufactured; bristles; wool; hides not chemically cured, coming from a district where cholera prevails, shall be refused shipment until thirty days have elapsed since last exposure, unless unpacked and disinfected as hereinafter provided.

Feathers which have been used should be disinfected, and invariably by steam.

Par. 9. The articles enumerated in the preceding paragraph coming from a district where yellow fever prevails, destined for ports or places south of the southern boundary of Maryland during the quarantine season, or where small-pox or typhus fever prevails in epidemic form, should be refused shipment, unless disinfected as hereinafter provided.

Par. 10. Articles such as gelatin, glue, glue-stock, fish-glue, fish-bladders, fish-skins, sausage-casings, bladders, dried blood, having been

in any way liable to infection in the process of preparation, gathering, or shipment, should be disinfected.

Par. 11. Any covering shipped from or through an infected port or place, and which the consul or medical officer has reason to believe infected, should be disinfected.

Par. 12. Any article presumably infected, which cannot be disinfected, should not be shipped.¹

ARTICLE V.—PASSENGERS AND CREW.

Par. 1. Passengers, for the purposes of these regulations, are divided into two classes,—cabin and steerage.

Par. 2. No person suffering from a quarantinable disease, or scarlet fever, measles, or diphtheria, should be allowed to ship.

Par. 3. Steerage passengers and crew, coming from districts where small-pox prevails in epidemic form, or who have been exposed to small-pox, shall be vaccinated before embarkation, unless they show evidence of immunity to small-pox by previous attack or recent successful vaccination.

Par. 4. Steerage passengers and crew who, in the opinion of the inspecting officers, have been exposed to the infection of typhus fever, should not be allowed to embark for a period of at least fourteen days after such exposure and the disinfection of their baggage.

Par. 5. When practicable, passengers should not ship from an infected port. Steerage passengers coming from cholera-infected districts must be detained five days in suitable houses or barracks located where there is no danger from infection, and all baggage disinfected as hereinafter provided; the said period of five days to begin only after the bathing of the passengers, disinfection of all their baggage and apparel, removal of all food brought with them, and isolation from others not so treated.

Par. 6. Steerage passengers from districts not infected with cholera, shipping at a port infected with cholera, unless passed through without danger of infection and no communication allowed between passengers and the infected locality, should be treated as those in the last paragraph.

Par. 7. Prior to sailing from ports infected with cholera, each passenger of the cabin class should produce satisfactory evidence as to his exact place of abode during the five days immediately preceding embarkation; and if it appear that he or his baggage has been exposed to contagion, such passenger should be detained such length of time as shall be deemed necessary by the inspecting officer, and the baggage should be disinfected.

¹ Upholstered furniture, sheep-skins used as wearing-apparel, bedding, bones, horns, and hoofs.

Par. 8. The rules prescribed for the disinfection of the baggage and personal effects of passengers and crew coming from cholera-infected ports should also be observed with regard to passengers and crew coming from ports and places where plague, yellow fever, typhus fever, or small-pox is prevailing in an epidemic form.

Par. 9. Should cholera break out in the barracks or houses in which the passengers are undergoing the five days' observation, no passenger from said house or barracks should embark until five days' isolation from the last case and a repetition of the sanitary measures previously taken.

Par. 10. All baggage of steerage passengers destined for the United States shall be labeled. If the baggage has been inspected and passed, the label shall be a red label bearing the name of the port, the steam-ship on which the baggage is to be carried, the word "inspected" in large type, the date of inspection, and the seal or stamp of the consular or medical officer of the United States. All baggage that has been disinfected shall bear a yellow label, upon which shall be printed the name of the port, the steam-ship upon which the baggage is to be carried, the word "disinfected" in large type, the date of disinfection, and the seal or stamp of the consular or medical officer of the United States. It is understood, and it will be so printed on the blank, that the label is not valid unless bearing the consular or medical officer's stamp or seal.

Par. 11. Each steerage passenger should be furnished with an inspection card. This card, stamped by the consular or medical officer, is to be issued to every member of a family as well as to the head thereof.

Par. 12. Form of inspection card (see next page).

Par. 13. Cabin passengers from cholera-infected ports or places should be given a special inspection card, on which shall be printed the port of departure, name of passenger, name of ship, date of departure, and an indicated space for the seal or stamp of the consular or medical officer.

Par. 14. The baggage of such cabin passengers shall be labeled in the same manner as steerage baggage.

Par. 15. In a port where cholera prevails, or where yellow fever prevails in epidemic form, the crews of passenger-ships should remain on board during their stay. Should additional men be shipped, the same precautions should be observed with them as in the case of steerage passengers. If it is considered necessary, the crews of freight-ships may be similarly treated, at the discretion of the medical officer.

Par. 16. Passengers and crews, merchandise and baggage, prior to shipment at a non-infected port, but coming from an infected locality,

INSPECTION CARD.

(Immigrants and Steerage Passengers.)

Port of Departure.....

Date of Departure,

Name of Ship.....

.....

Name of Immigrant.....

Last Permanent Residence.....

Inspected and passed at	Passed at quarantine, port of, U. S. (Date.)	Passed by Immigration Bu- reau, port of..... (Date.)
{ Seal or Stamp of Consular or Med- ical Officer. }		

(The following to be filled in by ship's surgeon or agent prior to or after embarkation.)

Ship's list or manifest.....

No. on ship's list or manifest.....

Berth No.	Steam-ship Inspection.	1st day.	2	3	4	5	6	7	8	9	10	11	12	13	14	To be punched by ship's surgeon at daily inspection.
.....																

(REVERSE SIDE.)

Keep this Card to avoid detention at Quarantine and on Railroads in the United States.

Diese Karte muss aufbewahrt werden, um Aufenthalt an der Quarantäne, sowie auf den Eisenbahnen der Vereinigten Staaten zu vermeiden.

Cette carte doit être conservée pour éviter une détention à la Quarantine, ainsi que sur les chemins de fer des États-Unis.

Deze kaart moet bewaard worden, ten einde oponthoud aan de Quarantijn, alsook op de ijzeren wegen der Vereenigde Staten te vermijden.

Conservate questo biglietto onde evitare detenzione alla Quarantina e sulle Ferrovie degli Stati Uniti.

Tento lístek musíte uschovati, nechcete-li ukarantény (zastavení ohledně zjištění zdraví) neb na dráze ve spojených státech zdržení býti.

Tuto kartočku treba trítmat' u sebe aby sa predešlo zderžovaňu v karantene aj na železnici ve Spojených Státoch.

Vaccinated.
(Signature or Stamp.)

should be subject to the same restrictions as are imposed in an infected port.

ARTICLE VI.—REQUIREMENTS AT SEA.

Par. 1. The master of the vessel should cause the following rules (which comprise those recommended by the International Conference at Rome, 1885) to be observed during the voyage:—

(a) The soiled body-linen of passengers and crew suffering from infectious disease should be at once immersed in boiling water or in a disinfecting solution.

(b) The water-closets should be washed and disinfected twice a day.

(c) Rigorous cleanliness and free ventilation should be maintained during the voyage on board all ships.

Par. 2. An inspection of the vessel, including the steerage, should be made by the ship's physician once each day.

Par. 3. Should cholera (or cholérine), yellow fever, typhus fever, or small-pox appear on board a ship while at sea, those who first show symptoms of these diseases will be immediately sent to the hospital; the ship's physician will then immediately notify the captain, and all of the effects liable to convey infection which have been in use will be destroyed or disinfected.

Par. 4. The compartments occupied by those who fall sick with infectious disease should be disinfected, and, as far as possible, the compartments thus disinfected should be freely exposed to the air. If the vessel is an iron steamer and the compartments suitable, the entire compartment should be disinfected by steam. The articles liable to convey infection should remain in the compartments during the disinfection. After disinfection of the compartments the bedding and clothing may be removed and dried.

Par. 5. Patients with infectious disease should be isolated.

Par. 6. The hospital should be disinfected as soon as it becomes vacant.

Par. 7. The dead should be enveloped in a sheet saturated with one of the strong disinfecting solutions, without previous washing of the body, and at once placed in a coffin hermetically sealed, or buried at sea.

Par. 8. A clinical record should be kept on the prescribed form, by the ship's surgeon, of all cases of sickness on board, and delivered to the quarantine officer at the port of arrival.

Par. 9. Under the foregoing paragraphs, disinfecting solutions are limited to the following: Strong: acid solution of bichloride of mercury (1 to 500); a 1 to 20 solution of pure carbolic acid. Weak: acid solution of bichloride of mercury (1 to 1000); pure carbolic acid, 1 to 40.

Par. 10. Form for clinical report¹:—

Name.	Age.	Sex.	Last permanent residence	Date of admission.	Disease.	Discharged.	Result.
Clinical history.							
Clinical history.							
Clinical history.							
Clinical history.							

Par. 11. Sailing-vessels leaving ports infected with yellow fever, and destined for any port in the United States south of the southern boundary of Maryland, which is not provided with proper facilities for treatment, shall, during the quarantine period, be directed by the consular or medical officer to proceed, for disinfection and treatment, to some quarantine station in the United States provided with the required facilities.

ARTICLE VII.—DISINFECTION.

Par. 1. The disinfection of iron vessels shall be as follows:—

(a) *Holds*.—After mechanical cleansing, the hold to be thoroughly washed with an acid solution of bichloride of mercury 1 to 800 (mercury 1 part, hydrochloric acid 2 parts, water 800 parts), applied under pressure to all surfaces by means of a hose.

In case the Disinfection is Required for Yellow Fever.

If the cargo is so stowed as to admit of disinfection, the hold and cargo may be disinfected without breaking bulk, by sulphur dioxide, 10 per cent. per volume strength, forty-eight hours' exposure for iron and seventy-two hours for wooden vessels.

(b) *Steerage and Forecastle*.—The same treatment should be given the steerage and forecastle as the hold, but when practicable steam disin-

¹ Temperature to be recorded.

fection of these compartments should be practiced. The temperature in all parts of the compartments is to be not less than 100° C.

(c) *Cabins, Officers' Quarters, Staterooms, etc.*—The bedding, fabrics, and carpets should be removed and disinfected by steam. After thorough mechanical cleansing, the exposed surfaces of fabrics which cannot be removed should be washed with a solution of bichloride of mercury ¹ 1 to 1000, or 3-per-cent. solution of carbolic acid, both of which should be removed, but not under two hours. Afterward the apartments should be thoroughly dried and aired.

Par. 2. The disinfection of wooden vessels is to be accomplished as follows: After mechanical cleansing, washing out the bilges until clean, etc. (first), by fumigation by sulphur dioxide, 10-per-cent. strength, twenty-four hours in the cabin and forecastle and forty-eight hours in the hold; and (second) flushing or washing with acid solution of bichloride of mercury in large quantity (1 to 800). The bilges to be first flushed with sea-water, pumped out, and then treated with the acid solution of bichloride of mercury in large quantity, allowed to remain in long contact. In addition to the sulphur fumigation of such apartments, the cabins, forecastle, and other apartments, and their contents, to be treated as those on iron vessels.

Cargo.

Par. 3. Disinfection of rags and old jute, etc., shall be by one of the following methods:—

(a) By boiling in water for not less than thirty minutes.

(b) By steam at the temperature of 100° C. for not less than thirty minutes after such temperature is reached.

(c) By exposure for not less than six hours in a closed compartment to a 4-per-cent. strength (per volume) of sulphur-dioxide gas,—made by burning roll sulphur or by the liberation of liquefied sulphur dioxide,—allowance to be made for leakage by increasing the amount of sulphur.

Par. 4. In all of the above methods, the rags, old jute, etc., must be unbaled, and in the disinfection by steam or sulphur the rags must be loosely spread on racks (preferably wire netting) in layers of not more than six inches in depth, and in such a manner as to insure the diffusion of the gas to all parts alike.

The articles must not at any time occupy more than 50 per cent. of the total cubic space, and the exposure to date from the complete combustion of the sulphur.

Par. 5. New feathers for bedding shall be disinfected by one of the following methods:—

¹ Polished metal is injured by mercury, and leather by steam.

(a) By steam at a temperature of 100° C. for a period of thirty minutes after such temperature has been reached.

(b) By exposure to sulphur dioxide, 4-per-cent. strength per volume, for not less than six hours.

Par. 6. Human hair or other hair, unmanufactured, and bristles, to be disinfected by sulphur dioxide, 4-per-cent. strength per volume, six hours, or, if not clean, by a solution of pure carbolic acid, 4-per-cent. strength, the articles to be thoroughly saturated.

Par. 7. Wool to be disinfected by sulphur dioxide, 4-per-cent. strength per volume, for not less than twenty hours, the wool to be unbaled and loosely spread on racks, as in the manner provided for the disinfection of rags.

Par. 8. Hides to be disinfected by sulphur dioxide, 4-per-cent. strength per volume, for not less than twenty hours, or by thorough saturation with a solution of pure carbolic acid, 4-per-cent. strength; hides to be invariably unbaled for the purpose.

Par. 9. Articles mentioned in paragraph 10, Article IV, should be disinfected by being spread on racks and exposed to sulphur dioxide, 4 per cent. per volume, twenty hours.

Par. 10. Coverings should be disinfected—

(a) In the hold, by exposure to sulphur dioxide, 10-per-cent. strength per volume, for twelve hours; the cargo being so stowed as to allow access to all parts of such surfaces.

(b) By breaking bulk and exposure to sulphur dioxide, 4-per-cent. strength per volume, for twenty-four hours.

(c) By wetting thoroughly with solution of bichloride of mercury 1 to 800.

Par. 11. The disinfection of personal effects, prescribed by these regulations, should be as follows:—

(a) Clothing and bedding should be disinfected by (1) exposure to steam from 100° to 102° C. for thirty minutes after such temperature is reached, or by boiling for thirty minutes; (2) immersion in bichloride solution 1 to 800, or solution of pure carbolic acid, 3 per cent., until thoroughly wetted, and allowed to dry before washing.

This last process (2) to be used only for articles that will be injured by steam or boiling.¹

(b) Cooking and eating utensils should be immersed in boiling water.

NOTE.—A 4 per cent. per volume strength of sulphur dioxide can be obtained by burning not less than 4 pounds 2 ounces of sulphur to each 1000 cubic feet of space; the compartment to be air-tight.

¹ Articles of rubber, leather, celluloid, gutta-percha, hats, furs, skins, and similar articles, are injured by steam or boiling.

A 10 per cent. per volume strength can only be obtained by one of the following methods: By the use of a special furnace, or by liquefied sulphur-dioxide gas.

ARTICLE VIII.—RECORDS, REPORTS, ETC.

The officer making the inspection will preserve in his office a record of each inspection made. A copy of said record will be forwarded weekly to the Supervising Surgeon-General of the Marine-Hospital Service, at Washington, D. C.

In addition to the duties already prescribed, the medical officer, when detailed in accordance with the Act of Congress approved February 15, 1893, shall furnish such reports to the Supervising Surgeon-General of the Marine-Hospital Service as may be required by the latter.

NOTES FOR THE INFORMATION OF MASTERS OF VESSELS AND OTHERS.

FORMULÆ FOR STRONG DISINFECTING SOLUTIONS.

Bichloride of Mercury. (1:500.)

Bichloride of mercury	1 part.
Hydrochloric acid.....	2 parts.
Water.....	500 parts.
Mix.	

Carbolic Acid.

Carbolic acid (pure).....	50 parts.
Warm water.....	1000 parts.

FORMULÆ FOR WEAK SOLUTIONS.

Bichloride of Mercury. (1:1000.)

Bichloride of mercury.....	1 part.
Hydrochloric acid.....	2 parts.
Water.....	1000 parts.

Carbolic Acid.

Carbolic acid (pure).....	25 parts.
Warm water.....	1000 parts.

DISINFECTION OF HOSPITALS, INFECTED COMPARTMENTS, ETC.

(a) By steam as provided in Article VII, paragraph (c); or, when steam is not available—

(b) By methods prescribed in Article VII, paragraphs (a) and (c).

Water-closets, etc., should be disinfected by strong solution of bichloride of mercury or carbolic acid.¹

It is suggested that a vessel should carry, for every 100 passengers: Bichloride of mercury, 5 pounds; hydrochloric acid, 10 pounds; carbolic acid, 10 pounds.

¹ The use of these disinfecting solutions does not preclude the additional use of hypochlorite of lime.

EFFICIENCY OF FOREIGN REGULATIONS.

The wisdom of this method of procedure and the efficient working of these regulations are demonstrated by the following statement taken from the report of the medical officer of the Marine-Hospital Service on duty at Naples, Italy, where, during the summer of 1893, cholera was epidemic:—

“From the 15th of July to August 17th there were eight vessels cleared from Naples with steerage passengers,—four for New York and four for South American ports. The first to leave was the *Karamania*, for New York, on July 15th. No cholera at that time existed in Naples. The first case occurred in Naples on the night of the 16th, and the result of the bacteriological examination was not known until the afternoon of the 17th or morning of the 18th.

“The passengers for the *Karamania* and the ship itself were put through the established routine. The ship was cleaned; ventilation, etc., altered to conform with the United States law; closets and hospitals put in good order; water- and food-supply attended to; passengers inspected and vaccinated, and both their baggage and clothing searched for food. Three days after sailing, *i.e.*, on the 18th, a death from cholera occurred, and just before reaching New York there were two more. It is not unlikely that the infection in the first cases was traceable to the same source as those occurring in Naples on the 16th. It is more than probable that but for the careful exclusion of food brought by passengers there would have been more cases on the remaining three ships for the United States. The regulations governing infected ports were rigidly enforced. The first vessel to leave, four days after the cholera was announced, was the *Massilia*. Her passengers were met at the trains and conducted immediately on board; were there isolated three days, and all their baggage transferred across city unopened. All food was carefully looked into; all from persons or baggage excluded; and the baggage of a few, about whose antecedents there was doubt, disinfected by steam. The ship was warped

out some distance from the pier every night, and an inspector kept on board night and day. There being no cholera known to exist anywhere in Italy outside of Naples, it was not thought necessary to disinfect all baggage or isolate five days. She arrived safely in New York without mishap. The remaining two for the United States were the *Weser* and *Cashmire*; in both cases the regulations were enforced in detail. One lay about a mile and a half off shore during her five days. The other cruised at sea. In both cases an inspector was kept aboard day and night. Both escaped cholera.

“The four for South America, with the result in each case, were as follow: The figures are not official, but are practically accurate in every respect. All were turned back by the South American authorities: *Vencinzio Florio*,—about 50 deaths; *Andrea Dorio*,—90 on way out, total not ascertained; *El Remo*,—84 deaths; *Carlo R.*,—about 230 deaths.

“To summarize, then, eight ships left Naples. The water-supply was the same and the food about the same; the class of passengers identical, and their places of origin similar,—in many cases identical. All four leaving without precautions became floating pest-houses. Of the four for the United States, the one leaving before cholera appeared in Naples had 3 deaths; the other three were made to conform to the regulations, and all escaped. In other words, every ship that left Naples had cholera except those in whose case the ‘infected port’ regulations were carried out; and of the five that had cholera, the only one that escaped with less than 50 deaths was the one on which our ‘non-infected port’ regulations were enforced, she having only 3 deaths *en route*. In addition, the enforcement of the regulations compelled the abandonment of a number of other sailings for the United States. The escape of the *Massilia*, *Cashmire*, and *Weser* may be ‘post,’ not ‘propter hoc,’ but we certainly have the right to consider the evidence to be strongly on the side of ‘propter.’”

DOMESTIC QUARANTINE.

The trans-oceanic part of the voyage completed, the vessel arrives in the waters of the United States, and here she is confronted by a municipal, State, or national quarantine station, where the question will be determined whether the measures prescribed have been carried out, whether they have been effective in the particular case, and, in fine, whether the vessel, her crew, passengers, and cargo are or are not a menace to the health of the city and the country at large.

MARITIME QUARANTINE STATIONS.

In describing a maritime quarantine station it should be borne in mind that the details in the plant must vary in accordance with the special demands of each port.

Thus, it is not to be expected that at Charleston, where immigration is limited, there should be the same provisions for detention of immigrants as at New York, through whose portals more than one-third of a million of immigrants pass each year; or San Francisco, where enter the throng of travelers and immigrants from the far East.

We should not expect that Boston, in the more salubrious North, would have the means or adopt the practice of discharging ballast, cleaning and fumigating every vessel from an infected port, which is the invariable custom at Pensacola.

But, leaving these variations for subsequent notice, the first thing to be considered, in the establishment of a complete maritime quarantine, is proper location. This must be at a point remote from city or village boundaries, and not likely to be encroached upon by urban growth. It should be more or less removed from the channels of commerce, and yet be easily accessible. Indifference to proper location could very readily make the quarantine station a source of danger instead of a protection.

THE QUARANTINE PLANT.

The requirements of a maritime quarantine station may be enumerated as follows: 1. A boarding-station. 2. A boarding-vessel. 3. Anchorages. 4. Wharves with warehouse, disinfecting machinery, and machinery for discharge of ballast. 5. Lazaretto, or hospital for treatment of contagious diseases. 6. Hospital for treatment of non-contagious diseases. 7. Barracks for the detention, in groups, of suspects, or persons who have been exposed to contagion or infection. 8. Bath-house. 9. Water-supply. 10. A cremation furnace. 11. Quarters for medical officers. 12. Laundry.

1. THE BOARDING-STATION.—This includes a boat-house, with boatmen's quarters so located as to avoid infection from the Lazaretto, and to be within easy reach of passing commerce.

2. BOARDING-VESSEL.—The facilities for boarding and inspection will vary with the location of the station, whether within the limits of a land-locked harbor or exposed to the full force of wind and sea. In the former case a steam- or naphthalaunch, or even a row-boat, will suffice; but in the latter case the boarding-boat must be a steamer, preferably of the sea-going tug-boat type, for it must be remembered that any delay in making the inspection inflicts hardship on commerce, and must inevitably produce discontent and complaint.

3. ANCHORAGES.—Two anchorages, one for infected and one for non-infected vessels. The anchorage for the detention of the infected vessel should be conveniently removed from the main establishment and safely remote from the track of commerce. Its position should be sheltered, and good holding-ground for vessels' anchors is of the first importance. The channel to the anchorages, and, if necessary, their boundaries, should be plainly marked by buoys.

4. WHARVES.—A wharf or pier is a prime essential in the equipment of a complete station, and should be located in water at least twenty feet deep, and should be of such length

that the largest vessels trading at the port can lie there safely; at least, in all ordinary weather. Upon this wharf there should be a warehouse for the storage of baggage and portions of cargo (practically, cargo is never fully discharged, being disinfected *in situ*). On the wharf should be placed the steam disinfecting chambers, sulphur-furnaces, and tanks for holding disinfecting solutions. (At certain stations the disinfecting apparatus is necessarily placed on a barge.) When required, a special, additional wharf should be provided for the discharge of ballast.

Steam Disinfecting Chambers.—The principle of disinfection by steam was first advocated by Dr. A. N. Bell, of Brooklyn; but the credit of first designing apparatus for the special purpose belongs to Dr. Joseph Holt, and his design was subsequently improved upon by Dr. Wilkinson and others.

Steam Chambers.—These chambers consisted of cylindrical shells, made of strong boiler-iron, 40 to 50 feet long and 7 to 8 feet in diameter (inside measurement), furnished with doors at each end. The steam was admitted directly to the interior of the chamber, and in addition there was a coil of pipe for the application of dry heat. These chambers were fairly efficient in action, but there was a great waste of space, and with the exercise of every possible care there was always more or less wetting of fabrics by the water of condensation. Many improvements have been made from time to time in the construction of steam disinfecting chambers, those constructed for the national quarantine station at San Francisco, Cal., being of the same general construction, but dispensing with the coil of pipe, and substituting therefor a jacket surrounding the entire chamber.

The most recent steam chambers are the joint plan of Passed Assistant Surgeon J. J. Kinyoun, Marine-Hospital Service, and Mr. W. H. Francis, of the Kensington Engine-Works of Philadelphia. They are of rectangular section, 16 feet in length, 4 feet 6 inches in width, and 5 feet 6 inches in height, and are

provided with steam-tight doors opening at either end. The chambers are constructed of an inner and outer steel shell $2\frac{1}{2}$ inches apart, with cast-iron end frames, intermediate truss bands, and of stay-bolt construction.

The doors have concave steel plates riveted to cast angle frames fitted with heavy rubber gaskets; they are handled by convenient cranes, and drawn tight by drop-forged steel eyebolts, swinging in and out of slots in the door-frames. The rectangular form is adopted in preference to the round, as it gives the most effective space during exposure, with little loss of steam, and enables cars on tracks to be readily handled in and out. The jacket is used to give perfect circulation and distribution of heat, to prevent condensation, and to dry the goods exposed. The jackets, which are filled with steam during the entire operation of the plant, make the chambers drying ovens; so that the articles to be disinfected are brought to the required temperature before the admission of steam to the inner chamber, and are thoroughly dried after the steam has been exhausted.

In the experiments of Professor Koch in connection with Dr. Wollfhügel it was found that hot air alone, even at a temperature of 230° to 248° F., after an exposure of three hours, would not with certainty destroy bacilli and spores. It is necessary, therefore, to eliminate the possibility of the pocketing of air, or of a mixture of air and steam, during exposure. To prevent this a vacuum pump is attached to the system of piping, whereby a vacuum of 15 to 20 inches is produced in the chamber prior to the admission of steam. In previous chambers this important point was neglected, and this accounts for the unreliable results obtained by a number of disinfecting plants.

For convenience of handling the goods to be disinfected, each chamber is provided with two cars of light wrought-iron construction, with removable trays with bottoms of galvanized-iron wire netting, and having a series of bronze wardrobe-hooks in the top of the frame-work, thus permitting the articles

to be laid out upon the trays, or, in the case of finer clothing, to be hung upon the hooks. The doors at both ends allow the cars to be brought in at one end and removed at the other, thus securing complete separation of infected and disinfected articles. After exposure the cars, upon being unloaded, are returned to the working end of the chamber by means of transfer tables and side-tracks, permitting a continuous working of the plant.

The system of piping is so arranged that steam may be admitted to the top or bottom of the chamber at will, through several openings, and has perfect circulation. Galvanized-iron hoods are placed in the chambers, so that steam is not forced directly on the clothing. The chamber is provided with thermometers to register the temperature, vacuum and steam gauges, safety-valves, traps, and is covered with magnesia non-conducting covering.

Sulphur-Furnace.—For a long time the method of sulphur fumigation pursued was to put into iron pots a quantity of sulphur varying from three to four pounds to one thousand cubic feet, igniting this by means of alcohol, and to place them in the hold or apartment to be disinfected. An apparatus was designed by Passed Assistant Surgeon J. J. Kinyoun, Marine-Hospital Service, for the purpose of producing SO_2 in greater percentage, and consisted of a furnace built on the reverberatory plan, with a series of shelves arranged one above another, each shelf carrying a pan of burning sulphur. A forced draught is kept up by means of a fan-blower connected at the bottom. The draught of air charged from the burning sulphur is made to reach and pass over the shelf above by means of apertures made by shortening the shelves alternately at their rear and front extremities. With an experimental furnace, Dr. Kinyoun states that “repeated experiments gave from 14 to 16 per cent. of SO_2 , temperature 21°C , while burning sulphur in a closed place gave only 6 per cent. at 21°C .,—i.e., the air would not support the combustion of sulphur above that percentage.”

This has been almost entirely superseded by a furnace that

is simpler in construction, and which has given admirable results in practice. The furnace is double, and has been provided with small fire-boxes at each end, over which are placed two shallow cast-iron pans five feet long, and the whole inclosed in a frame of sheet-iron. The sulphur is placed in the pans and a fire lighted in the furnaces, melting the sulphur, which quickly ignites. To prevent too rapid combustion baffle plates are arranged, and the proper quantity of air is admitted through adjustable valves in the furnace-fronts. The fumes of sulphur dioxide thus generated are collected and carried into a reservoir, from which they are sucked by an exhaust fan, and are thence forced through piping and large flexible hose to the apartment to be fumigated.

The sulphur-furnace in use at the Louisiana Quarantine Station is the same in general principle, with the addition that the air supplied to the burning sulphur is aspirated from the hold of the vessel, and then forced into the furnace.

Disinfection by Germicidal Solutions.—The apparatus for the use of the disinfecting solutions consist of a tank or tanks elevated above the level of the floor of the wharf to a sufficient height to force the solution through a hose and nozzle to the parts of the ship to be reached. The tank is to be filled by a steam-pump, and the solution is easily made by surmounting the tank with a keg perforated by numerous holes, in which keg the powdered bichloride is to be put, and the water for filling the tank pumped over it.

It is a much better plan to have the bichloride solution distributed by means of a special pump (made of iron to prevent amalgamation), as, with the pressure of the pump behind it, it penetrates much more deeply into cracks and crevices and, in fact, knocks the dirt and filth out of them.

5 and 6. HOSPITALS.—The propriety of having separate hospitals for contagious and non-contagious diseases is so obvious that it need not be dwelt on here, and the necessity of a separate establishment for suspects, until the nature of

their complaint can be positively made out, is patent and only in accord with expediency and the ordinary instincts of humanity.

7. BARRACKS.—Barracks for the detention of suspects are not an essential part of the equipment of every quarantine station, but are a necessity only at such stations as are situated at the great ports of entry, which are the ports of arrival of the vast hordes of immigrants who seek our shores. Barracks are an indispensable adjunct in the management of ship-loads of immigrants suspected of being infected with cholera, typhus fever, and small-pox, and would be required in the case of yellow fever but for the fact that there is little or no immigration from the yellow-fever zone.

The barracks should be commodious, substantial, and yet of simple and inexpensive construction. They should be well ventilated and so arranged that every part of the building is under constant surveillance, and so subdivided that the inmates are divided into small groups and intercourse between the groups prevented. The immigration law requires that the immigrants shall be listed and arranged in groups of thirty, and it would be well that this number be preserved as the unit for segregation. The barracks should be furnished with bunks, arranged in tiers one above the other, and furnished with bedding of a simple and inexpensive character.

Clothing of a simple but sufficient kind, and capable of easy laundering, should be provided in sufficient quantity to furnish each inmate of the barracks with a change while his or her own personal effects are undergoing the process of disinfection. Attached to the barracks there should be a kitchen, thoroughly equipped with all the facilities for furnishing hot food of a simple character for the number of inmates provided for by the barracks. Dining-rooms should be arranged, and special care should be taken to prevent the carrying of any food into the barracks. It is perhaps needless to say that, in the barracks, the sexes should be separated, and the better arrange-

ment is to have two buildings,—one for men and one for women and children.

Latrines.—Latrines of ample size should be provided, and should be so arranged that all dejecta may be received into metallic vessels containing a germicidal solution of acknowledged potency; or, if the dejecta are to be received into a sewer, there should be some provision made for their complete disinfection prior to their discharge into the sea or a cess-pool.

8. BATH-HOUSE.—Bathing facilities are an important part of the equipment of a quarantine station designed for the handling of large numbers of suspects. The best form of bath for the purpose is the shower- or rain- bath, it being more easily managed, more expeditious, and probably more efficacious than the tub-bath. The bath-house should be provided with a room for disrobing, from which the suspects will pass into the bathing-stalls proper, and there receive a bath the temperature of which is under the sole control of the bath-attendant. From the bath the suspect will pass into a robing-room, where he will be given a suit of sterile clothing, while the clothing which was removed in the disrobing-room is carried by proper attendants to the disinfecting apparatus, there to be rendered safe by sterilization.

9. WATER-SUPPLY.—An abundant supply of pure water is not only a desideratum, but a prime necessity, at all quarantine stations where it is designed to accommodate cholera suspects. It would be desirable to provide a supply of twenty gallons per capita per day, and no arrangement will probably give such good results as the sinking of an artesian well, if the nature of the soil and the geological formation permit. If it is impracticable to sink such a well, the next best plan would be to arrange for the distillation or sterilization, by boiling, of a sufficient quantity of water for drinking purposes.

10. CREMATORY.—A crematory is a desirable part of the equipment of every quarantine station, as it admits of no argument that cremation is the best possible method of disposing of

the bodies of those dead of contagious or infectious disease. In addition, it would be desirable that all garbage and waste about a quarantine station be incinerated to prevent the possibility of infection.

11 and 12. Detailed description of quarters for medical officers and of laundry is unnecessary.

Having thus considered the necessities and the desiderata in the equipment of a quarantine station, it is now proper to consider the regulations governing them, and for this purpose are here appended the regulations prepared by the Supervising Surgeon-General of the Marine-Hospital Service, and promulgated by the Secretary of the Treasury on April 26, 1894. These regulations are to be considered a minimum for the stations under municipal and State control, some of which have additional requirements:—

QUARANTINE REGULATIONS TO BE OBSERVED AT PORTS AND ON THE
FRONTIERS OF THE UNITED STATES.

PREAMBLE.

1. At or convenient to the principal ports of the United States, quarantine stations should be equipped with all appliances for the inspection and treatment of vessels, their passengers, crews, and cargoes.

2. At all other ports where such provisions have not been made, inspection stations should be maintained.

3. An inspection service should be maintained at every port throughout the year.

4. At a fully-equipped quarantine station there should be adequate provision for boarding and inspection, apparatus for mechanical cleaning of vessels, apparatus for steam disinfection, apparatus for disinfection with sulphur dioxide, apparatus for disinfecting solutions, hospitals for contagious and doubtful cases, detention barracks for suspects, bathing facilities, crematory, and sufficient supply of good water.

5. The *personnel* of quarantine stations in the yellow-fever zone and on fruiers bound for Southern ports should be immune against yellow fever.

6. At quarantine stations all articles liable to convey infection should be handled only by the employés of said station, unless the services of the crew are indispensable.

7. Vessels having been treated at national quarantine stations that are located a considerable distance from the ports of entry of said vessels may be inspected by the local quarantine officer, and, if for any sanitary reason it is considered inadvisable to admit the vessel, he should report the facts immediately by telegraph, when possible, to the Supervising Surgeon-General Marine-Hospital Service, detaining the vessel pending his action.

8. The following regulations are the required minimum standard, and do not prevent the addition of such other rules as, for special reasons, may be legally made by State or local authorities.

ARTICLE I.—INSPECTION.

1. Vessels arriving at ports of the United States under the following conditions shall be inspected by a quarantine officer prior to entry :—

A. Any vessel with sickness on board.

B. All vessels from foreign ports.

C. Vessels from domestic ports where cholera or yellow fever prevails or where small-pox or typhus fever prevails in epidemic form.

Exceptions.—Vessels not carrying passengers on inland waters of the United States. Vessels from the Pacific and Atlantic coast of British America, provided they do not carry persons or effects of persons non-resident in America for the sixty days next preceding arrival, and provided always that the port of departure be free from quarantinable disease. Vessels from other foreign ports via these excepted ports shall be inspected.

D. Vessels from foreign ports carrying passengers having entered a port of the United States without complete discharge of passengers and cargo. Such vessels shall be subject to a second inspection before entering any other port. Vessels from ports suspected of infection with yellow fever, having entered a port north of the southern boundary of Maryland without disinfection, shall be subjected to a second inspection before entering any port south of said latitude during the quarantine season of such port.

2. The inspections of vessels required by these regulations shall be made by daylight, except in case of vessels in distress.

3. In making the inspection of a vessel, the bill of health and clinical record of all cases treated during the voyage, crew and passengers' lists and manifests, and, when necessary, the ship's log shall be examined. The crew and passengers shall be mustered and examined and compared with the lists and manifests, and any discrepancies investigated.

4. No person except the quarantine officer, his employés, United States customs officers, or agents of the vessel, shall be permitted to

board any vessel subject to quarantine inspection, until after the vessel has been inspected by the quarantine officer and given its discharge.

ARTICLE II.—QUARANTINE.

1. For the purpose of these regulations, the quarantinable diseases are cholera (cholérine), yellow fever, small-pox, typhus fever, and leprosy.

2. Vessels arriving under the following conditions shall be placed in quarantine :—

A. With quarantinable disease on board.

B. Having had such on board during the voyage or within thirty days next preceding arrival; or, if arriving in the quarantine season, having had yellow fever on board after March 1 of the current year, unless satisfactorily disinfected thereafter.

C. From ports infected with cholera, or where typhus fever prevails in epidemic form, coming directly or via another foreign port, or via United States ports, unless they have complied with the United States quarantine regulations for foreign ports; also vessels from non-infected ports, but bringing persons or cargo from places infected with cholera, yellow fever, or where typhus fever prevails in epidemic form, except as subsequently noted.

D. From ports where yellow fever prevails, unless disinfected in accordance with these regulations, and not less than five days have elapsed since such disinfection.

Exceptions.—The following exceptions may be made to Rules C and D with regard to vessels from ports quarantined against on account of yellow fever :—

(a) Vessels arriving during certain seasons of the year—to wit, from November 1 to May 1—may be admitted to entry.

(b) Vessels bound for ports in the United States north of the southern boundary of Maryland, with good sanitary condition and history, having had no sickness on board at ports of departure *en route* or on arrival, provided they have been five days from last infected or suspected port, may be allowed entry at port of destination. But if said vessels carry passengers destined for places south of this latitude the baggage of said passengers shall be disinfected.

In making an inspection of a vessel, if from a port where yellow fever prevails, and between May 1 and November 1 of any year, the inspector shall ascertain the destination of each passenger thereon, and if bound for places south of the southern boundary of Maryland the baggage of such passenger shall be disinfected according to the rules for such articles infected with yellow fever. Such baggage shall be labeled.

(c) Vessels engaged in the fruit trade from ports declared safe for this purpose by the Supervising Surgeon-General Marine-Hospital Service may be admitted to entry without detention, provided that they carry no passengers and have carried no passengers from one port to another and have no household effects or personal baggage in cargo, and have complied with the special rules and regulations made by the Secretary of the Treasury with regard to vessels engaged in said trade.

3. All persons arriving on vessels having had small-pox on board must be vaccinated or show satisfactory evidence of recent vaccination or of having had small-pox, or be detained in quarantine for not less than fourteen days, and all effects and compartments liable to convey infection disinfected.

4. All passengers occupying apartments other than first or second cabin shall be vaccinated prior to entry, unless they can show that they have had small-pox, or have been recently successfully vaccinated, or be detained in quarantine fourteen days.

5. Vessels arriving at quarantine with leprosy on board shall not be granted pratique until the leper with his or her baggage has been removed from the vessel to the quarantine station.

No case of leprosy will be landed.

If the leper is an alien passenger and the vessel is from a foreign port, action will be taken as provided by the immigration laws and regulations of the United States.

If the leper is an alien and a member of the crew and the vessel is from a foreign port, said leper shall be detained at the quarantine at the vessel's expense, until taken aboard by the same vessel when outward bound.

ARTICLE III.—GENERAL REQUIREMENTS AT QUARANTINES.

1. Pilots bringing infected vessels will be detained in quarantine a sufficient time to cover the period of incubation of the disease for which the vessel is quarantined, if, in the opinion of the quarantine officer, such pilots have been exposed to infection. The dunnage of pilots shall be disinfected when necessary.

2. No direct communication shall be allowed between quarantine, or any vessel in quarantine, and any person or place outside, and no communication except under the supervision of the quarantine officer.

3. No ballast shall be allowed to leave the quarantine station, unless disinfected.

4. Where it is impossible to disinfect cargo *in situ*, it shall be removed and disinfected in the manner provided for articles of their class in these regulations; such articles to be unpacked and so arranged as to

allow the disinfectant used to reach every part of all surfaces of said articles.

5. Vessels arriving at any port of the United States with cholera or yellow fever aboard during the quarantine season shall be remanded to an anchorage set apart for infected vessels, there to remain until after the discharge of the passengers and purification of the vessels.

6. All passenger baggage disinfected under the requirements of these regulations shall be labeled.

ARTICLE IV.—TREATMENT IN QUARANTINE OF CHOLERA-INFECTED VESSELS.

1. ¹ Remove all passengers from the vessel and all of the crew (if cholera has occurred on board) save those necessary to care for her. Place the sick in hospital and carefully isolate those specially suspected. Segregate the remainder in small groups. No communication shall be held between these groups. Those believed to be especially capable of conveying infection must not enter the barracks until they are bathed and furnished with sterile clothing; nor shall any material capable of conveying infection be taken into the barracks, especially food.

2. If cholera has occurred in the steerage, all occupants thereof must be bathed and their clothing disinfected.

3. At once proceed with the disinfection of the hand-baggage.

4. All baggage and effects accompanying steerage passengers, and any other baggage or effects that may have been exposed to infection, must be disinfected.

5. Such articles of cargo as are liable to convey infection must be disinfected.

6. All living-apartments and furniture and such other portions of a vessel as are liable to convey infection shall be disinfected.

7. On cholera-infected vessels the water-supply must be changed without delay, the casks or tanks disinfected by steam or 10-per-cent. solution of potassium permanganate, and after thorough rinsing refilled from a source of undoubted purity, or the water supplied must have been recently boiled.

8. Nothing shall be thrown overboard from a cholera-infected vessel, not even deck sweepings. Such things shall be burned in the furnace or in a place specially designated, but not in the galley.

ARTICLE V.—DISINFECTION, ETC.

1. *Holds*.—The disinfection of iron vessels shall be as follows:—

(a) With cargo: If cargo is so stowed as to admit of disinfection, it and the hold may be disinfected without breaking bulk, except to such

¹ It is required only if cholera has occurred on board.

a degree as to make disinfection practicable, by sulphur dioxide, 10 per cent. per volume strength, for not less than twenty-four hours' exposure.

(b) Without cargo: After mechanical cleansing, the hold (1) to be thoroughly washed with an acid solution of bichloride of mercury 1 to 800 (mercury 1 part, hydrochloric acid 2 parts, water 800 parts), applied under pressure to all surfaces by means of a hose; (2) by sulphur dioxide, 10 per cent. per volume strength, for twenty-four hours.

2. *Steerage and Forecastle*.—When possible to obtain it—

(a) The steerage and forecastle shall be disinfected by steam; the temperature in all parts of these compartments to be not less than 100° C. for not less than thirty minutes after such temperature has been reached.

(b) When steam cannot be obtained these compartments shall be treated in the same manner as required in the disinfection of the empty hold.

3. All bedding and furnishings of the steerage and forecastle to be left in place during the disinfection by steam.

If steam disinfection of steerage is not used, such articles must be removed under the strictest sanitary precautions for disinfection by steam or burning.

4. The bedding, fabrics, and carpets should be removed and disinfected by steam or by boiling. After thorough mechanical cleansing the woodwork and all other exposed surfaces shall be washed with an acid solution of bichloride of mercury 1 to 1000, or a 3-per-cent. solution of pure carbolic acid. Fabrics which cannot be removed shall be thoroughly saturated with a solution of bichloride of mercury 1 to 1000, or a 3-per-cent. solution of pure carbolic acid.

5. The water ballast of a vessel coming from a cholera-infected port should be discharged at sea, or, if discharged in fresh or brackish water, must be previously disinfected. The tanks to be flushed and refilled with sea-water or disinfected.

6. For a wooden vessel the treatment is as above, except that exposure of the hold and living-apartments to sulphur dioxide, 10-per-cent. volume, must precede the other treatment. This exposure must be, for the hold, forty-eight hours, and for living-apartments twelve hours.

7. All solid ballast to be discharged or disinfected previous to disinfection of hold. All ballast discharged in fresh water to be disinfected by saturation with, or immersion in, an acid solution of bichloride of mercury 1 to 800. Clear, hard, close-grained rock may be permitted to remain on board, but only after disinfection by immersion in an acid solution (1 to 800) of bichloride of mercury. Ballast removed from vessels must not be taken from the quarantine station.

ARTICLE VI.—DETENTION OF PASSENGERS ON ACCOUNT OF CHOLERA.

1. The people detained shall be inspected by the physician twice daily, and be under his constant surveillance, and no intercourse will be allowed between different groups while in quarantine.

2. No direct communication shall be allowed between any person detained in quarantine and any one not in quarantine, except through the quarantine officer or, by his order, through his agents.

3. The water- and food- supply will be strictly guarded to prevent contamination, and issued to each group separately.

4. Food of a simple character, sufficient in quantity, thoroughly cooked, shall be issued to those detained in quarantine. No fruit shall be permitted.

5. Cleanliness of quarters and of persons shall be enjoined and enforced daily. Disinfection shall be used where there is any possibility of infection.

6. Water-closets, urinals, privies, or troughs shall be provided, and their contents disinfected before they are discharged,

7. In any group in which cholera appears, the sick will be immediately isolated in hospital, and the remaining persons in the group shall be bathed and their effects be disinfected; then removed to other quarters, if possible, and the compartment disinfected.

8. No direct communication shall be allowed between the physician and attendants of the hospital and those detained in quarantine.

No persons shall be discharged from quarantine until five days have elapsed since the last exposure to infection and a final disinfection of such effects as were taken to barracks.

No convalescent from cholera shall be discharged from quarantine until after a sufficient time has elapsed to insure his freedom from infection.¹

9. The body of no person dead of cholera shall be allowed to pass through quarantine. The body should be cremated if practicable. If not, it should be wrapped, without preliminary washing, in a sheet saturated with a solution of bichloride of mercury 1 to 500, and buried, surrounded by caustic lime.

ARTICLE VII.—DISINFECTION OF PERSONAL EFFECTS OF PASSENGERS AND CREW AND CARGO.

1. Clothing, bedding, and articles not injured by steam shall be disinfected—

(a) By exposure to steam at a temperature of 100° to 102° C. for thirty minutes after such temperature has been reached.

¹ To be determined by bacteriological examination.

(b) By boiling for fifteen minutes; all articles to be submerged.

(c) By a thorough saturation in a solution of bichloride of mercury 1 to 1000, and allowed to dry before washing.

2. Articles injured by steam (rubber, leather, etc.) and containers, to the disinfection of which steam is inapplicable, shall be disinfected by thoroughly wetting all surfaces with a solution of bichloride of mercury 1 to 800, or a 5-per-cent. solution of carbolic acid, and allowed to dry in open air.

3. Cooking and eating utensils, by immersing in boiling water or steam.

4. All rags and old textile fabrics used in the manufacture of paper, and all old gunny, old jute, etc., fit only for remanufacture, gathered, collected, packed, or handled in any port or place where cholera (cholerine) or yellow fever exists, or where small-pox or typhus fever prevails in epidemic form, and for thirty days after the port or place shall be officially declared free from such diseases or epidemic, shall be denied entry into any port of the United States.

5. No rags or old textile fabrics used in the manufacture of paper, or articles enumerated in the preceding paragraph, which have not been disinfected in accordance with Article VII, paragraph 3, of the "United States Quarantine Regulations for Foreign Ports," shall be admitted into the United States.

(Old jute bags, old cotton bags, old rope, new cotton and linen cuttings from factories, not included.)

ARTICLE VIII.—TREATMENT OF VESSELS INFECTED OR SUSPECTED OF
BEING INFECTED WITH YELLOW FEVER.

1. Where practicable, at once remove the sick to hospital; remove and isolate all persons not required for the care of the vessel.

2. If the hold is deemed infected, there shall be a preliminary disinfection as hereinafter provided.

3. The bilge should be cleansed with sea-water, if possible, before disinfection, and the hold rendered mechanically clean.

4. All ballast, except close-grained, hard rock, must be discharged. This may be retained aboard if disinfected by immersion in an acid solution of bichloride of mercury 1 to 800.

5. After discharge or disinfection of ballast the vessel should be disinfected.

6. If it is so stowed as to admit of disinfection, the cargo and the hold may be disinfected without breaking bulk, except to such a degree as to render disinfection practicable.

It shall be as follows:—

Holds to be treated with sulphur dioxide, 10-per-cent. strength per volume, forty-eight hours' exposure for iron vessels, seventy-two hours' exposure for wooden vessels.

7. Empty holds to be disinfected as follows:—

(a) If of iron, by sulphur-dioxide gas, 10-per-cent. strength per volume, for twelve hours' exposure, followed by washing with an acid solution of bichloride of mercury 1 to 800, applied under pressure to all surfaces by means of a hose.

(b) If of wood, by the same methods as the preceding, save that exposure to sulphur-dioxide gas shall be for forty-eight hours; air-strakes to be open.

8. Cabin, forecastle, etc., after mechanical cleansing, to be first treated with sulphur dioxide, not less than 6-per-cent. strength per volume, twenty-four hours' exposure. Then (after cleansing with water, if desired) wash all exposed surfaces with a solution of bichloride of mercury 1 to 800, or 3-per-cent. pure carbolic acid.

9. Clothing, bedding, and all fabrics which can be removed, not injured by steam, shall be disinfected—

(a) By exposure to steam at a temperature of 100° to 102° C. for thirty minutes after such temperature has been reached.

(b) By boiling for fifteen minutes; all articles to be submerged.

(c) By a thorough saturation in a solution of bichloride of mercury 1 to 1000, and allowed to dry before washing.

10. Articles injured by steam (rubber, leather, etc.) and containers, to the disinfection of which steam is inapplicable, shall be disinfected by (a) thoroughly wetting all surfaces with a solution of bichloride of mercury 1 to 800, or a 5-per-cent. solution of pure carbolic acid, and allowed to dry in open air; or (b) by exposure to the sulphur fumigation, in cabin, forecastle, or hold.

11. The *personnel* of the vessel shall be detained five days from completion of the disinfection.

12. If the vessel has been disinfected under the supervision of an accredited medical officer of the United States at the port of departure, the period of quarantine may date from completion of such disinfection, and shall not be less than five days.

ARTICLE IX.—PASSENGER TRAFFIC.

Passenger traffic may be allowed during the quarantine season from any port infected with yellow fever to any port of the United States south of the southern boundary of Maryland, under the following conditions:—

(a) Vessels to be of iron and clean immediately prior to taking on passengers.

(b) The vessel must lie at moorings in the open harbor and not approach the wharves, nor must the crew be allowed ashore at the port of departure.

(c) All passengers and crew must be immune to yellow fever, and so certified by the United States medical officer.¹

(d) All baggage which has not been disinfected at the port of departure by the United States medical officer, or which is not in bond for points north of the southern boundary of Maryland, shall be disinfected at the quarantine at the port of arrival; no bedding or household effects to be allowed to enter.

ARTICLE X.—MISCELLANEOUS.

1. The treatment of vessels infected with typhus fever shall be the same as that prescribed for yellow fever.

2. The detention of passengers and crew for small-pox and typhus fever shall cover the period of incubation of the disease, the time of detention to commence from the date of last exposure; typhus fever, not less than twenty days; small-pox, not less than fourteen days.

3. Vessels detained at any national quarantine will be subject to such additional rules and regulations as may be promulgated from time to time by the Supervising Surgeon-General.

4. The following is the form of certificate which shall be issued to the vessel by the health officer when she is released from quarantine:—

_____, _____, 189—.

I CERTIFY that _____, of _____, from _____, has in all respects complied with the quarantine regulations prescribed by the Secretary of the Treasury, and that in my opinion she will not convey quarantinable disease. Said vessel is this day granted free pratique.

Health (Quarantine) Officer,
Port of _____.

ARTICLE XI.—INSPECTION OF STATE AND LOCAL QUARANTINES.

In the performance of the duties imposed upon him by the act of February 15, 1893, the Supervising Surgeon-General of the Marine-Hospital Service shall, from time to time, personally or through a duly-detailed officer of the Marine-Hospital Service, inspect the maritime quarantines of the United States, State and local, as well as national, for the purpose of ascertaining whether the quarantine regulations prescribed by the Secretary of the Treasury have been or are being complied with.

¹ The evidence of immunity which may be accepted by the sanitary inspector is: First. Proof of continued residence in an endemic focus of yellow fever for ten years. Second. Proof of previous attack of yellow fever.

The Supervising Surgeon-General, or the officer detailed by him as inspector, shall at his discretion visit any incoming vessel, or any vessel detained in quarantine, and all portions of the quarantine establishment, for the aforementioned purpose, and with a view to certifying, if need be, that the regulations have been, or are, being enforced.

ARTICLE XII.—CANADIAN AND MEXICAN FRONTIERS.

1. When practicable, alien immigrants arriving at Canadian and Mexican ports, destined for the United States, shall be inspected at the port of arrival by the United States consular or medical officer, and be subjected to the same sanitary restrictions as are called for by the rules and regulations governing United States ports.

2. Inspection cards will be issued, by the consular or United States medical officer at the port of arrival, to all such alien immigrants, and labels affixed to their baggage, as is required in the case of those coming direct from foreign ports to any port of the United States.

3. Whenever alien immigrants are not inspected at the port of arrival by the United States consular or medical officer, they shall enter the United States through certain designated places on the frontier, where they shall be inspected for the purpose of preventing the introduction of quarantinable disease. This inspection shall be held by daylight.

4. If any person be found suffering from a quarantinable disease, or presumably infected, he shall be denied entry so long as danger of conveying the infection exists.

5. Any baggage or other effects believed to be infected shall be refused entry until made safe by a proper disinfection.

6. Persons coming from localities where small-pox is prevailing in epidemic form shall not be allowed entry without vaccination, unless they are protected by a previous attack of the disease or a recent successful vaccination.

7. Persons coming from localities where typhus fever prevails in epidemic form shall not be allowed entry until they have been away from such locality fourteen days and their baggage disinfected.

8. During the quarantine season persons coming from places where yellow fever prevails will not be permitted to enter until they have been away from such locality five days and their baggage has been disinfected. But persons immune to yellow fever will not be detained.

9. No common carrier which is infected, or suspected of being infected, shall be allowed to enter the United States until after such measures have been taken as will render it safe.

10. Articles of merchandise, personal effects, etc., which are capable

of conveying infection, and which are presumably infected, shall not be allowed entry into the United States until after disinfection.

11. The methods of disinfection shall be those prescribed in the Rules and Regulations made for the maritime quarantines of the United States.

Immigrants who, with their baggage, have been inspected at a port of the United States by a quarantine officer upon landing, will be exempt from further quarantine inspection when re-entering the United States from Canada, unless there is reason to believe that disease has developed among such immigrants since such landing and inspection.

It is the intention of the act of February 15, 1893, under which these regulations were framed, to have them act uniformly and without discrimination against any place, and at the same time to not interfere with the operation of any additional regulations imposed by State or local authority.

MANAGEMENT OF A QUARANTINE STATION.

Inspection.—Upon the arrival of a vessel at a quarantine station, during the active quarantine season, she should be boarded without delay, and the following general routine followed, with such modifications as may be demanded by the local conditions or dictated by the experience of the quarantine officer. In the event of the arrival of several vessels at the same time, they should, as a rule, be boarded as nearly as possible in the order of their arrival, the rule of “first come, first served” being observed; though it may be remarked that, in the event of the arrival, at nearly the same time, of a vessel carrying passengers and one carrying cargo only, there will usually be little opposition on the part of ship-masters if the passenger-ship is inspected first. Arrived on board, it is well to demand the immediate attendance of the master, not only from the fact that all information must be sought from him, but to impress all concerned with the fact that the authority of the boarding-officer is, for the time, absolute. The master should then be required to produce for inspection his bills of health, the ship’s manifest, and the crew- and passenger- lists,

if the ship carry passengers. These should be carefully scrutinized, the number of crew and passengers being noted or borne in mind, and note being made of any articles of cargo that come within the proscription of the regulations. All special consular certificates bearing on doubtful articles of cargo had better be looked into at this time. A careful inspection of the ship should now follow, particular attention being paid to the condition of the living-apartments of the officers and crew, as their condition of cleanliness or the reverse sometimes forms an important index to the cleanliness of the whole ship. The hatches should be removed, and such portions of the cargo as come directly under them be subjected to scrutiny. If the vessel is in ballast, the hold should be entered, explored, and mental note made of the condition of the ship's inner planking or skin, whether dry and sound or rotten and damp. If possible, a limber plank should be lifted, and the condition of the bilges noted. In the comparatively inaccessible places fore and aft there will likely be found deposits of trash and filth, and the chain-lockers should be carefully examined to see whether the cables have been properly washed prior to stowing, as there is good reason to believe that the harbor-mud of certain ports, notably Havana, is dangerous. The inspection of the ship proper completed, the inspection of persons should be entered into.

Every person borne upon the ship's papers as passenger or member of the crew should be personally seen by the boarding-officer or his assistant, and no excuse whatever should be taken for an absence from this muster. Take nothing for granted, and compel the master to explain any discrepancies between the lists and the actual number presenting themselves for examination. The decision must now be reached whether the vessel goes free under the regulations or is to be detained in quarantine. If the former, the certificate of inspection is filled out, and the master notified that he is at liberty to proceed. If the latter, the vessel is directed to a suitable anchorage, and the

yellow quarantine flag is hoisted at the foremast-head. Quarantine procedures proper now begin, and much depends on the nature of the disease quarantined against; the nature and condition of the ship, whether light, in ballast, or loaded. If there are passengers on board, these are landed, bathed, and assigned to quarters in the barracks. The vessel is laid alongside of the wharf and the disinfecting processes prescribed by the regulations entered upon.

The disinfection of iron and wooden vessels, while depending on the same general principles, differs essentially in detail. This is illustrated in the following article on the "Disinfection of Wooden Vessels," by Surgeon H. R. Carter, published in the "Annual Report of the Marine-Hospital Service for 1892":—

SOME POINTS IN THE DISINFECTION OF WOODEN VESSELS FOR YELLOW FEVER.

There are many points of difference to a quarantine officer between wooden sailing-vessels and steam-ships. The former lie longer in the ports of clearance; the crews have communication with the shore; there are more deserters, and consequently more men are shipped at these ports to take their places. All of these things affect a vessel's sanitary standing.

The points, however, to which it is desired to call attention at present are (1) the treatment of ballast and (2) the disinfection of the hold, and both apply only to wooden sailing-vessels.¹

TREATMENT OF BALLAST.

This ballast is regarded differently by different boards of health, but by all as at least "suspicious."

Florida regulations require the discharge of all ballast from infected ports before a vessel is allowed to enter. If the vessel is judged infected the ballast aboard must be removed at the refuge station to which she is sent, and new ballast not from an infected port substituted if any is needed. Disinfection of ballast is not recognized.

Louisiana² allows it to be wet *in situ* with bichloride solution and to remain aboard during the fumigation; then it is considered safe (1891).

¹ Save schooners and American-built square-rigged craft of small burden (brigantines and barkentines mainly), practically all sailing-vessels from yellow-fever ports come in ballast.

² The recommendation for a ballast lighter in the report of the Louisiana quarantine physician, 1890, shows that this method was not perfectly satisfactory to him.

Savannah, which ascribes an epidemic to ballast, and Charleston, while requiring all ballast to be discharged at their own quarantine stations, yet allow "dipped" ballast from vessels that have been infected to be there discharged along with ballast from non-infected vessels, thus agreeing to its harmlessness. A vessel of which the ballast may be infected is not allowed at either of these quarantine stations.

Mobile and Mississippi ports allow "dipped" ballast to enter port, and, if need be, to remain aboard or to be discharged ashore.

Is ballast often a source of infection? From Havana, yes. From Brazilian ports, if of rock, no. It depends mainly on its material and whence procured.

From Havana, Cienfuegos, and some other Cuban ports comes a fairly-good white stone; a soft, crumbly, blue rock, containing tale and mixed with clay; and what is called by masters and in the manifest "sand," but which contains so much old plaster, broken tiles, and bricks that "rubbish" would seem a better name for it.

Twice this last and once (two cases) the blue-stone ballast is believed to have been the source of yellow fever in vessels at the Gulf Quarantine since 1887.

Rio, Santos, and the Brazilian ports south of Pará send a gneiss or granite rock, not hard for its kind, but far better than the best Cuban ballast, and a loam due to its decomposition. This is also called "sand" in the manifests, and if dry may be taken for sand; but it is really a loam, setting like cement when wetted. It is alkaline. Few vessels for Gulf or South Atlantic ports bring this "sand," as it is objected to by most quarantine officers, and the masters of vessels are suspicious of it themselves, and when wet it makes a very dirty ship.

From Rio both kinds come from high hills or mountains across the bay from the city, and the locality is considered to be a healthy one, but in 1889 I was informed that there was yellow fever among the quarrymen as bad as elsewhere.

Even with what is called rock ballast there is much small stuff and dust, especially under the hatches where it is taken in. This forms a compact mass with the larger stones under the hatches, there being frequently one hundred to one hundred and fifty tons of this close ballast in a vessel. The finest of it, however, is only granite sand, undecomposed, and does not cohere with water.¹

The writer is cognizant of only one case of yellow fever (British bark *Chippewa*, 1890), presumably due to Brazilian ballast, and this may well have been from another source. Nevertheless, in such rock ballast

¹ In 1889, when there was a very bad epidemic in Rio, the rock ballast from that port was nearly all small stuff. The government was using large rock on some public works, and the vessels took for ballast what was left on the lighters.

at the Gulf Quarantine have been found rotten boards, articles of clothing, and (once) faecal matter, all at such a depth in the ballast that they must have come aboard at the port of departure (Rio, in these instances).

Ballast from Colon is, for rock ballast, the worst possible, and, if infected, the best fitted to preserve infection. It is a friable, porous stone (coral?), filled with slimy mud, a fresh fracture staining water. Many cases of malarial (Chagres) fever were seen, certainly due to working in this ballast, but no yellow fever has been ascribed to it the past four years. Probably little has been at Colon during this time. Cases of yellow fever were ascribed to ballast from Vera Cruz at the Gulf Quarantine (French ship *Emil Postel*, 1891).

Regarding ballast from infected ports, then, as "suspicious" or "probably infected," it may be either (a) discharged or (b) disinfected. When possible, the former method is, of course, preferable on the ground of economy, the ballast being discharged by lighter or otherwise in about eight feet of water. Unfortunately, most square-rigged sailing-vessels require ballast for their own safety, especially when going from outlying refuge stations to their loading ports; and while ballast-logs may be substituted in certain cases, yet in many others, the majority, they are inapplicable. It is, therefore, in general, impossible to leave such a vessel empty of all ballast at a refuge station. Enough close-grained, picked rock (no small stuff or trash being allowed) to trim the vessel and render her safe may be disinfected and retained aboard. This disinfection is accomplished by dipping each piece in a solution (acid) of HgCl_2 , 1 to 800 or 1000, as it is trimmed in the vessel's hold. The rock is immersed completely in the solution, and stays wet with it some time, besides being continually wetted by the solution running down from those piled on it. Although some boards of health will not allow any ballast from an infected port or vessel to enter their jurisdiction, yet it is believed that this dipped stone, hard and clean, is safe. Certainly, if washing a wooden, more or less splintered keelson with bichloride solution renders it safe to enter port with the vessel, the immersion of a granite rock in the same solution should give it, the rock, the same immunity. Indeed, the risk of conveying infection by picked rock, even without the disinfection, must be exceedingly small.

This is not the slow process it may seem, but is obviously slower than wetting the ballast with a hose as it lies, and a number of experiments were made at the Gulf Quarantine by wetting rock ballast with bichloride solution, opening the pile and testing individual stones for mercury. The solution was served through a $1\frac{1}{2}$ -inch hose by a strong steam-pump under full pressure, and observations were made aboard the ships *Sardinian*, *Chrysolite*, *Prince Regent*, and *Curlew*, and barks

President, Mabine, and others. In every case stones were found some part of which gave no reaction for mercury. As a rule, the parts in contact with other stones had been wet, while the parts not so in contact quite frequently did not show the reaction.

A consequence of this is that where ballast is first fumigated and then wet down with bichloride solution there is some probability of the SO_2 reaching the parts of the stones not wet by the bichloride. This is less apt to take place if the fumigation follow the wetting down.

It seemed as if the liquid followed certain paths in passing through the ballast, and after a certain amount of solution had been used no proportionate increase of wetting was observed by increasing the use of the solution. In these experiments the solution was used considerably in excess of what is usually used in wetting down ballast.

Letters from masters of vessels which had had their ballast so treated elsewhere state that the ballast (rock and fine stuff) was, after the process, in good condition for handling except near the surface and next the keelson; that no sand was carried into the bilge, and that "most of the fine stuff was as nice and dry as if the ballast had not been wet down." The same statements have been made verbally by several masters of vessels.

It seems doubtful, then, if it be possible to certainly wet *all* of a vessel's rock ballast *in situ* by an amount of water short of submerging it, and that, if the ballast be infected, this method is less sure than that of dipping.

Also, if ballast be thoroughly wetted, it is obvious that much sand must pass through the ceiling, stopping the limbers, fouling the pumps, and doing a certain amount of damage to the vessel, and requiring considerable work of the crew to correct it.

Where this method was tried with sand it seemed to wet all of it; at least every piece selected in the two vessels experimented on yielded the mercurial reaction. The sand was leveled so as to be as thin as possible, ditches dug across the hold, and then filled with the solution. After this soaked in, the ridges were turned into the ditches and the place where the ridges had been ditched, and these filled with solution of bichloride. To wet the sand thoroughly required from one-twentieth to one-twelfth of its weight of water.

Colon stone is probably not disinfected by immersion in the solution of bichloride unless the time of immersion be considerably prolonged—hours or days; nor was it ever judged safe to attempt to disinfect the rubbish ballast from Havana.

Of course, the ballast is to be disinfected as far as possible *in situ* before discharging any, when it is believed that moving it will endanger

the workers. But wet ballast is exceedingly disagreeable to handle and is injurious to the vessel, and, indeed, all work about a presumably infected vessel should be done by the acclimated quarantine crew.

DISINFECTION OF HOLD.

In 1888, 1889, and 1890 a series of rough experiments were made at the Gulf Quarantine to determine the penetrating power of SO_2 in sufficient amount to destroy animal life—ants and cockroaches. These were made in the holds of vessels undergoing disinfection, so as to be under the same conditions as those in which the gas was used in practice. These cannot be given in detail here, but they showed that a film of water (sea-water) from three to five inches thick presented such a barrier to the passage of the gas that in forty-eight hours it would not destroy insect life beyond it; that clothes soaked in sea-water thick enough to stay wet were equally impenetrable, while the same clothes dry allowed insects to be killed within them; that rotten pine-wood, if reasonably dry, was penetrated four inches with the grain and less than two inches across the grain; that this same wood soaked in sea-water was impervious for even one inch with the grain.

Dr. Kinyoun informs me that a 10-per-cent. atmosphere of SO_2 (10-per-cent. volume) will destroy certain micro-organisms through six inches of rotten wood containing 16 per cent. of moisture,—I presume, with the grain.

Now, in the hold of a vessel rotten wood is most apt to be found, if anywhere, in the timbers in the ill-ventilated spaces between the skin and ceiling, at the ends of the deck beams, at the water-line near the stern, but in every case between the skin and ceiling. In spite of air-strakes and ventilators, the communication between these spaces and the open hold is very meagre, and is rendered still more so by the "stop waters" in all American vessels,—pieces fitted in between the timbers to keep the bilge-water from splashing up on the cargo when the vessel lays over in sailing. Obviously, then, if the hold of a vessel be infected the infection is most probably in the rotten wood, a favorite nidus in ill-ventilated spaces, and it is difficult to reach.

It has been the habit to use a large amount of bichloride solution and to leave it in the vessel until she leaves quarantine, so as to splash about as she rolls and soak into her wood as thoroughly as possible. Nevertheless, it is obvious that no liquid can be depended on to reach and saturate all parts of the woodwork under the ceiling. A gaseous disinfectant is necessary if there be infection in these places, and the problem is to make it efficient. After opening every air-strake,—they are generally closed by battens on arrival in quarantine,—the main

dependence for reaching these spaces must be by the cracks between the planks in the ceiling. Now, if the vessel be fumigated immediately after she is washed down with bichloride solution, and the washing is done as it should be, all of these cracks and all of the small interstices, where beams, etc., come together, are filled by films of this solution, through which this gas cannot pass, or passes with difficulty, and the places which most need disinfection cannot get it.

This to me seems a more serious objection to using the bichloride solution before fumigating, in wooden vessels, than the fact that HgCl_2 is partially converted into Hg_2Cl_2 by the SO_2 , although this certainly occurs in pans holding bichloride in solution exposed in the hold of a vessel undergoing fumigation.

Also, to enable the gas to diffuse itself through the cracks into these spaces in sufficient proportion to be efficient as a disinfectant, it is necessary to have it in the hold a considerable time. At the Gulf Quarantine the hold was closed for forty-eight hours, and occasionally seventy-two hours. This was done to allow for this diffusion, and not because it was believed that so long a contact of the gas with any infecting organisms was desirable.

It seems right to state here that infection of the hold of a vessel, not meaning the ballast, is not common in vessels which have the houses on deck, and the contents of the hold, the ballast, is less commonly infected than the dunnage of the forecastle and cabin.

To determine what part of a vessel is infected, beyond a mere probability, is not usually possible; indeed, to determine if a vessel be "probably infected" is at times far from easy.

Officially this is determined by the regulations of the quarantine station or port of entry, but a vessel may be officially judged infected and (rightly) submitted to disinfection when, in point of fact, the probability of her being infected is slight; and (for Middle Atlantic ports) the converse may occur. The fact of a vessel having had yellow fever aboard, especially if only at the port of clearance and not *en route*, may not be sufficient to class her as "probably infected." The circumstances of the attacks may be such as to show that they were contracted ashore, and that the sick men did not contaminate the vessel; or there may be evidence to show that, although there was a source of infection aboard the vessel, it is no longer existing.

For an instance of the first, among many instances, the American ship *Fawne* had six cases of yellow fever developing aboard her while at Rio in 1891, but in every case it developed in seamen who, the log showed, had returned from shore less than thirty-six hours before, and there had been no development of fever among a considerable number,

twelve or fourteen, of unacclimated seamen living in the same fore-castle and working over every part of the ship for about fifty days since the last case aboard. From this vessel the sick were sent to hospital the first day of their sickness, with all of their loose dunnage with them. No supplies taken aboard, no men shipped, and only the master went ashore after the fever developed. This vessel was probably not infected at any time.

As an illustration of the second, far less common than the first, the British ship *Prince Frederick* was infected at Rio in 1889. A number of cases—thirteen, I think—developed aboard her under conditions which showed that they were contracted aboard,—i.e., in men who had had no recent communication ashore, and one case *en route*. She came up short-handed to Barbados, having *en route* destroyed some dunnage—that of the dead—and aired all of the rest, keeping it on lines in the sun all of every day when possible; cleaned and ventilated the houses above decks, and ventilated the hold. The weather the whole time was bright, with light winds. At Barbados the crew was strengthened by shipping new men, among them seven English lads, fresh young fellows from 16 to 21 years old, who had never been south before,—the most perfect *témoins* for yellow fever,—yet no case developed among them, even when they cleaned ship.

This vessel undoubtedly had a source of infection aboard, but was freed from it, probably, in consequence of the ventilation and other measures adopted.

If there be dunnage packed away aboard which was infected when packed, no time-limit can be relied on for removing the infection, while persistent airing in bright weather will probably do so. Even washing in cold water, as sailors do, seems to be sufficient to disinfect fabrics from yellow fever.

Several cases are known where aired or washed clothing was handled with impunity by a number of unacclimated persons, from which yellow fever had been contracted by those who unpacked or washed it, and no case of infection from well-aired clothing has ever been known to the writer. Moisture seems necessary for the infection to keep its efficiency.

It is not, of course, intended that airing, etc., should ever be relied on for the disinfection of fabrics; only to show that some vessels may clear themselves of infection by this method and ventilation.

TREATMENT OF YELLOW-FEVER VESSELS.

It is fortunate that vessels from yellow-fever ports rarely have any considerable number of passengers on board, and that

our efforts have therefore to be directed only to the cleansing of the ship, the care of those actually sick with the disease at the time of arrival, and the detention, under observation for a period of five days, of those exposed to the infection. The cleansing of the ship, whether of wood or iron, is specifically treated of in the regulations; the disinfection of the cargo presents few difficulties, as the cargo is usually either sugar or coffee, generally packed in bags, and admitting of thorough disinfection by the application of sulphur dioxide in the strength and for the time prescribed in the regulations. Several years ago the Louisiana State Board of Health issued a circular to shippers recommending that all cargoes of sugar and coffee be stowed with a shaft or tunnel under each hatchway, reaching from the upper tiers of the cargo to the keelson of the vessel. This shaft admits of the entrance of the sulphur-hose, and the gas, forced in under pressure, has free access to the envelopes of every package, which it penetrates to the depth of three-quarters of an inch or more, thus insuring thorough disinfection of the cargo without the necessity of breaking bulk, and at a minimum of time and expense.

The sick should be at once carried to the infected hospital, if their condition permit it, and the remainder of the crew and passengers inspected twice daily until the time of danger is passed and the vessel is discharged from quarantine.

Vessels from yellow-fever ports generally arrive at quarantine stations either light or in ballast. The treatment of these vessels is so fully dealt with in the foregoing article of Surgeon Carter that further comment is unnecessary.

TREATMENT OF CHOLERA VESSELS.

In the event of the arrival of a ship actually infected with Asiatic cholera, or suspected of such infection, a much more difficult problem confronts the quarantine officer, for the conditions differ widely from those obtaining in the case of the yellow-fever ship. In a majority of cases the cholera ship carries a

large number of passengers, a great majority of whom belong to the immigrant class, and the difficulty of handling these is largely increased by the carelessness of their personal habits, their ignorance and disregard of the first laws of personal hygiene, and the discomfort, crowding, and bad sanitary condition of their quarters on board ship. Here many sources of danger must be looked into, and it is almost certain that a disregard of any one of them will be followed by a terrible retribution in the shape of new outbreaks of the disease.

The first thing to be done in the treatment of a cholera-infected ship is to remove her human freight, and this should be done as rapidly as is consistent with safety. The occupants of the compartment of the ship in which cholera has appeared should receive our first and most careful attention. They must be landed at once, bathed with all possible precaution and thoroughness, furnished with clean, sterile clothing, and isolated in the barracks and regarded as especially dangerous. Those actually sick with the disease should be at once carried to the contagious hospital, and those sick with any complaint whatever isolated in the suspect hospital pending the determination of the actual nature of their disease.

The foregoing applies particularly to the steerage passengers. The question of the treatment of the cabin and saloon passengers is one that will call for all the tact and ingenuity of the quarantine officer, and even then he will be liable to savage criticism and censure through the friends of the cabin passengers detained. It must be remembered that these passengers are luxuriously lodged and catered for with every delicate attention that ingenuity and long experience, sharpened by active competition, can suggest. On board ship they are most carefully guarded from intrusion on the part of the steerage passengers, and, in fact, are as nearly on a separate ship as possible. Is it always necessary to subject these people to the inconveniences and possible hardships that are inseparable from a detention in quarantine barracks? The answer is that each case

must be decided on its individual merits, and much will depend on the extent to which the ship seems infected, the seeming source of the infection, and the facilities which exist on board ship for maintaining a sharp line of demarkation between the steerage and saloon.

If, on investigation, it seem that the choleraic outbreak is due to infected food smuggled on board by the emigrants, to infection probably brought aboard in the hand-baggage of the same class of passengers; if, in fine, it would seem to be due to conditions limited to the steerage, it *might* seem to be the part of wisdom to leave the cabin passengers in their luxurious quarters while the processes of disinfection and detention were in progress. If, on the contrary, the infection seem to be due to a polluted ship's water-supply; if there have been any cases of diarrhœal disease among the cabin passengers; if the infection seem to be distributed equally to the steerage and to the saloon, then all must be landed alike, and undergo barrack detention, at least, until the disinfection of the ship is thoroughly complete.

The barracks for the cabin passengers must, of course, be of a different character from those provided for the steerage. They must be subdivided into small rooms, and, instead of bunks, must be furnished with comfortable cots, bedding, and simple, but neat and efficient, toilet facilities. A separate kitchen and table must be provided for this class of passengers, and the whole situation may be summed up by saying that the relative difference on shipboard should be preserved on shore during the detention in quarantine.

SPECIAL MEASURES AGAINST CHOLERA.

Other features of quarantine administration are well expressed in the following extract from the editorial pages of the *Philadelphia Medical News* of October 15, 1887, showing the measures necessary to extinguish an incipient epidemic of cholera and to prevent its spread. Such measures are as follow :—

(a) Speedy recognition and isolation of the sick; their proper treatment; absolute and rapid destruction of the infectious agent of the disease, not only in the dejecta and vomit, but also in clothing, bedding, and in or upon whatever else it finds a resting-place.

(b) The convalescents should remain isolated from the healthy as long as their stools possibly contain any of the infecting agent; before mingling again with the well they should be immersed in a disinfecting bath, and afterward be clothed from the skin outward with perfectly-clean vestments, which cannot possibly contain any of the infectious material.

(c) The dead should be well wrapped in cloth thoroughly saturated in a solution of corrosive sublimate (1 to 500), and, without delay, *cortège*, or lengthy ceremonial, buried near the place of death in a deep grave, remote as possible from water which may, under any circumstances, be used for drinking, washing, culinary, or other domestic purposes. (Cremation, of course, is by far the safest way of disposing of cholera cadavers.)

(d) Those handling the sick or the dead should be careful to disinfect their hands and soiled clothing at once, and especially before touching articles of food, drinking, or culinary vessels.

(e) In the case of maritime quarantine, the well should be disembarked and placed under observation in quarters spacious enough to avoid crowding, and so well appointed and furnished that none will suffer real hardships.

(f) Once having reached the station, those under observation should be separated in groups of not more than twelve to twenty-four, and the various groups should, under no pretext, intermingle. The quarters for each group should afford stationary lavatories and water-closets in perfect working condition, adequate to the needs of the individuals constituting the group, and supplied with proper means of disinfection. There should be a bed raised above the floor, proper coverings, and a chair for each member of the group, each person being required to use only his own bed. There should be a common table of sufficient size to seat around it all the members of the group, who should be served their meals from a central kitchen, and with table-furniture belonging to the station and cleaned by the common kitchen scullions.

(g) Drinking-water, free from possible contamination and of the best quality, should be distributed in the quarters of each group as it is needed, and in such a manner that it is received in drinking-cups only. There should be no water-buckets or other large vessels in which handkerchiefs, small vestments, children's diapers, etc., can be washed by the members of any group.

(h) Immediately after being separated into groups in their respective quarters, every person under observation should be obliged to strip and get into a bath (a disinfecting one is preferable), and afterward be clothed with fresh, clean vestments from the skin outward. Every article of clothing previously worn should be taken away and properly disinfected.

(i) Then all of the personal effects should be at once removed to a separate building, washed (if possible), and thoroughly disinfected, or, if necessary, destroyed. After disinfection they should be temporarily returned to the members of groups, when occasion requires a further change of clothing.

(k) Under no circumstances whatever should washing of clothing by those under observation be permitted. All used clothing should be first thoroughly disinfected (by boiling, when possible), and then should be cleansed, the disinfection and washing being done by a sufficiently trained and absolutely reliable corps of employes supplied with adequate appliances.

(l) All those under observation should be mustered in their own quarters, and be subjected to a close medical inspection, *while on their feet*, at least twice every day, in order to discover and isolate, as soon as possible, new cases which may develop; and, of course, the clothing and bedding of these new cases should be treated without delay in the manner already mentioned. In the mean time, a watch should be set over the water-closets for the purpose of discovering cases of diarrrhœa, and, when discovered, such cases should be temporarily separated from the rest. They should receive judicious medical attention at once, and precautions should be taken as if they were undoubted but mild cases of cholera.

(m) The quarters should be kept thoroughly clean, and every surface upon which infectious material could possibly be deposited, including the floors, should be washed with a strong disinfectant twice daily, and oftener when necessary. Evacuations from the bowels should be passed into a strong disinfectant; the hopper of the closet should be then flushed and finally drenched with a quantity of the same disinfectant.

(n) For the proper attention to the sick, there should be two or more competent and experienced physicians, assisted by a sufficient corps of intelligent and efficient nurses, with hours of duty so arranged that a physician, with a sufficient number of nurses, shall be in constant attendance in the wards of the hospital.

(o) For the prompt recognition and separation of new cases, their temporary medical attention, the proper treatment of discovered cases

of diarrhœa or cholérine and of other maladies, and the immediate correction of every insanitary practice or condition by constant, vigilant, and intelligent supervision, there should be at least two or more competent and experienced physicians, with hours of service so arranged that a physician is on duty night and day among those under observation; and he should have, subject to his orders at any and every moment, a sufficient and efficient corps of nurses and laborers to carry out properly and promptly his directions.

(p) In order to prevent the intermingling of the various groups, to enforce obedience and order, and to make it absolutely impossible for the quarantined and their personal effects to have any communication with the exterior, a well-organized and sufficiently large police corps should patrol the borders of the stations and the buildings day and night.

(q) Any group among whom there have developed no new cases of cholera or of choleraic diarrhœa, during the preceding eight or ten days, may be regarded as harmless, and allowed to leave quarantine after each one is finally immersed in a disinfecting bath and re-clothed with clean garments from the skin outward, the garments removed being destroyed or thoroughly disinfected and cleansed, as already indicated.

As yet no reference has been made to the crew, ship, and cargo. What has been said of the treatment of those under observation applies to every one of the ship's inhabitants. The observation, isolation, and cleansing of the crew and their effects could safely be performed aboard ship if necessary. The ship should be thoroughly cleansed and disinfected, particular attention being given to the quarters of the emigrants and crew.

The following general regulations were promulgated for the government of camps and barracks for the detention of cholera suspects during the summer of 1892:—

REGULATIONS FOR CHOLERA CAMP.

(Prepared in the Marine-Hospital Bureau.)

The surgeon in command of the quarantine camp to have absolute authority over the police and sanitary regulations of the camp, and to see that they are obeyed.

Camp to be divided into two divisions,—detention and hospital. Former for housing of suspected cases and well persons from infected localities and the latter for treatment of sick.

DETENTION CAMP.

1. Persons destined for this camp to be assigned to specific quarters in tents. First to be subjected to disinfecting bath, and clothed afterward with fresh vestments. Not to leave this camp except by permission or order of surgeon in command.

2. Persons in detention camp to be inspected twice daily or oftener by medical officer or assistant, while standing, to ascertain any new cases which may develop.

3. New cases of cholera in detention camp to be immediately transferred to hospital camp for treatment, and all their effects disinfected, as well as the tent in which they may occur.

4. Guards to patrol detention camp night and day, to prevent intercourse between the two divisions of the camp.

5. Water-supply for entire camp to be boiled for drinking. To be dealt out to each person in cups or glasses for potable purposes. May be acidulated with diluted hydrochloric acid under supervision of a medical officer.

6. If there be room, the detention camp to be segregated into divisions of not more than twenty persons. No intercommunication should be permitted between the groups.

7. All clothing removed from persons entering detention camp to be subjected to steam heat (unmixed with air), not less than 100° C. (212° F.), for one-half hour, or boiling for one hour. Leather and rubber goods to be immersed in 3-per-cent. carbolic-acid solution until thoroughly saturated.

8. The washing of clothing not to be permitted by the detained persons under any pretext. After above disinfection, all laundry-work to be then done by the force of employés. The clothing of detained suspects should be kept in separate building after disinfection, and re-issued as required for change.

9. Cleanliness and disinfection of quarters and person to be enjoined and enforced daily. Disinfectants to be used where there is any possibility of infection.

10. At the expiration of five days, if no case of cholera or choleraic diarrhœa has developed in a given group segregated as above, those composing the group may be discharged, after a final disinfection of person and clothing.

11. All water-closets, urinals, privies, or troughs should be provided with latrines similar to those of the cholera camp, and means should be provided for their thorough disinfection before their contents are discharged into pits of unslacked lime.

12. Food issued shall be simple, thoroughly cooked, and served at stated hours. No fruit permitted.

HOSPITAL CAMP.

1. Day sick-calls at 8 A.M. and 4 P.M.; oftener, if necessary.

Night call, 12 P.M., by night physician; oftener, if circumstances require.

2. There shall be one nurse for every hospital tent, who shall be on duty in six-hour watches.

Night nurses according to circumstances. Female nurses for cases occurring in that sex.

Nurses should be instructed in the necessity of personal hygiene and the sources of infection.

3. Vomited matter and stools to be received into earthen vessels, and at once disinfected with 3-per-cent. solution of carbolic acid or 1 to 500 HgCl_2 combined with 2 parts of HCl to each part of HgCl_2 ; then thrown into a pit of unslacked lime, or discharged into the sea.

4. All soiled linen or clothing that cannot be disinfected to be immediately destroyed by burning.

5. When death occurs, body to be immediately buried, swathed in sheets saturated with 1 to 500 HgCl_2 . Place of interment to be selected to avoid contamination of water-supply.

6. No persons having personal contact with the sick or dead shall leave the hospital camp without practicing disinfection, as specified above.

DANGER FROM FLIES IN QUARANTINE.

In this article it has been suggested that all dejecta and vomited matters of cholera patients be received into vessels containing an efficient germicidal solution; and this is not only for the reason that the said dejecta and vomited matters may infect any one who comes into inadvertent contact with them, but has an important bearing on the health of those who are resident in the neighborhood of the quarantine station. It has been abundantly proved that the ordinary house-fly is capable of conveying in its intestinal tract, for a considerable length of time, living and active cholera spirilla. Knowing how constantly flies deposit their ordure on articles of food, it can easily be seen how great a menace to public health would be engendered by allowing stools containing the bacilli to remain without instant disinfection. The safer plan is, therefore, to not trust to subsequent disinfection, which might be overlooked in the press of other matters, but to receive the dejecta into the germicidal solution so that no time will be lost and no chances of infection may remain.

THE NATIONAL QUARANTINE SERVICE.

The national quarantine stations, eleven in number, are established at points of danger where either local quarantine is defective or where, by reason of peculiar advantage in location, protection is afforded to several States by one station. These stations are as follow:—

Delaware Breakwater Quarantine Station, Lewes, Del.; Reedy Island Quarantine Station, Delaware River; Cape Charles Quarantine Station, Fisherman's Island, Va.; South Atlantic Quarantine Station, Blackbeard Island, Sapelo Sound, Georgia; Brunswick Quarantine Station, Brunswick, Ga.; Key West Quarantine Station, Tortugas Islands, Fla.; Gulf Quarantine Station, Ship Island, Miss.; San Diego Quarantine Station, San Diego, California; San Francisco Quarantine Station, Angel Island, San Francisco Bay, California; and Port

Townsend Quarantine Station, Port Townsend, Washington. A station has been authorized by Congress and will be erected at Southport, N. C.

DESCRIPTION OF THE NATIONAL QUARANTINE STATIONS ON
DELAWARE BAY AND RIVER.

It may prove of interest to briefly describe a national quarantine station, and no better example can be found than the stations at Delaware Breakwater and at Reedy Island, Delaware River. These stations, while in a measure separate and distinct, are intended to work in connection with each other and to afford complete protection against the importation of contagious and infectious disease through the medium of the commerce which seeks the port of Philadelphia and the ports of entry on Delaware Bay, and situated in the States of Delaware, New Jersey, and Pennsylvania. At the station at Delaware Breakwater, which is situated at the mouth of Delaware Bay and immediately upon the point formed by Cape Henlopen, is the reservation, forty acres in extent, and surrounded by a substantial picket-fence ten feet in height. Within this enclosure is located the quarantine plant proper, consisting of commodious hospitals for contagious and non-contagious diseases, and barracks for the accommodation of one thousand suspects, fitted with bunks and provided with bedding and a full supply of clothing for both males and females. In connection with these barracks are a large kitchen, fully equipped with steam cooking-apparatus of the most improved description and a commodious mess-hall. There has been also provided a building containing a boiler for operating the pumps, a bath-house, and laundry, which latter is equipped with appliances for washing all soiled clothing and for subjecting them to the boiling process. In this building there is also located a steam disinfecting chamber of the most modern and improved type, and adjoining this building is a bath-house fitted with twenty shower- and two tub-baths, all provided with

hot and cold water. An artesian well has been sunk, capable of supplying twenty thousand gallons of water per day, and this water is raised by a powerful pump to elevated tanks, and from these distributed to the barracks, kitchens, hospitals, laundry, and bath-house.

Latrines are provided and furnished with iron containers holding a strong disinfecting solution, and provision is made for emptying these containers into a sewer, which, in turn, empties into a sewer common to the bath-house and laundry, which discharges into the sea. The danger of soil contamination by alvine discharges is reduced to a minimum, and the water-supply likewise protected. Outside of the fence is a large brick house, which furnishes executive and administrative offices and quarters for the medical officers on duty at the station. In front of the executive building is a lofty flag-staff, which affords the means for communicating by signals with vessels in quarantine and arriving in the offing.

Within a few hundred yards of the reservation is a long iron pier, which affords ample facilities for the landing of passengers.

Situated fifty-five miles above the Breakwater, and forty-five miles from Philadelphia, is the Reedy Island Quarantine Station, on and near the island of that name. Upon the island itself are situated the residence of the medical officer, quarters for employes, and a cottage hospital. A boat-house is connected with the island by a gangway. The quarantine plant proper is located on a pier situated on the edge of the channel, and in thirty feet of water. The pier is two hundred feet in length, and presents a frontage of nearly four hundred feet, owing to the placing of an ice-break above and below the pier. This affords room for the accommodation of the largest vessels, and upon the wharf is situated the disinfecting plant, consisting of two steam chambers; a sulphur-furnace, fan and engine for driving the same; tanks for disinfecting solutions and a pump and hose for their distribution; a fire-pump,

and tanks for the storage of water for fire and steaming purposes.

There are no barracks at this station, it being the plan that the vessel shall receive quarantine treatment at this point, and that the passengers shall undergo their detention in the barracks at the Breakwater station.

Another national station which deserves special notice from its peculiarities is the quarantine vessel *Jamestown*, which can be considered a floating quarantine station. The *Jamestown* was turned over to the U. S. Marine-Hospital Service by the Navy Department for quarantine use. She is one of the old-fashioned sailing-vessels of the navy, is very strongly and solidly constructed, and is one hundred and sixty-six feet long, thirty-six feet beam, and has a displacement of eight hundred and eighty-eight tons. She has been fitted for her present use by being housed in, and there have been placed on board a steam disinfecting chamber, a sulphur-furnace, tank for bichloride solution, and bath-rooms. In addition to these, she has been fitted as a place of detention for two hundred and fifty to three hundred immigrants, and is in all respects a complete quarantine station, and capable of doing valuable service in smooth water.

AIDS TO NATIONAL QUARANTINE.

In aid of the national quarantines, sanitary inspectors are appointed by the Marine-Hospital Service at special points of danger, either in the United States or abroad. Through the State Department consular notification from foreign ports is received regularly by mail, or, in emergency, by cable, and the information thus received, and that received also from home ports, is communicated, by the Marine-Hospital Bureau, to all quarantine authorities and others, by means of a weekly publication known as the "Abstract of Sanitary Reports."

An important source of information concerning the movements of vessels in every portion of the world is the "Maritime

Register," published in New York. The United States Collectors of Customs are efficient aids, having, by law, the power of search and detention of vessels, and having exceptional knowledge of the sanitary condition of the shipping at their respective ports. The Revenue-Cutter Service, a national coast patrol, gives frequent and efficient aid; the Light-house Establishment and Coast Survey render valuable assistance in locating and buoying the anchorages, and the Life-Saving Service, with its constant patrol of the coast, guards against the entry of a vessel at an unusual point. The surf-men are required to rake together and destroy dunnage and other material likely to be infected that have been thrown overboard and washed ashore from infected vessels. Finally, the Marine-Hospital Service, having, besides the quarantines, the care of the sick of the merchant vessels of the United States, with one hundred and twenty-six physicians stationed at the larger and many of the smaller ports, is ready at a moment's notice to extend indefinitely its quarantine service.

NATIONAL INSPECTION OF ALL QUARANTINES.

The Act of Congress approved February 15 1893, while contemplating that State and local quarantines shall not be disturbed in the exercise of their functions, provided said quarantines are administered in accordance with the law and the regulations made thereunder, further provides that the rules and regulations of local quarantines shall be examined by the Surgeon-General of the Marine-Hospital Service, and also that such additional rules and regulations as may be deemed necessary shall be made by the Secretary of the Treasury, and shall be enforced by the State or local quarantine authorities. If the latter refuse, or are unable to enforce them, the law further provides that the President of the United States shall detail or appoint an officer for this purpose. To carry out the intent of this law all the quarantines of the United States, national, State, and local, are inspected periodically by an officer of the Marine-

Hospital Service. Following are the instructions prepared for the inspecting officers:—

INSTRUCTIONS TO MEDICAL OFFICERS OF THE MARINE-HOSPITAL SERVICE
DETAILED TO MAKE INSPECTIONS OF STATE AND LOCAL QUARANTINES.

TREASURY REGULATIONS.

* * * * *

In the performance of the duties imposed upon him by the act of February 15, 1893, the Supervising Surgeon-General of the Marine-Hospital Service shall, from time to time, personally or through a duly-detailed officer of the Marine-Hospital Service, inspect the maritime quarantines of the United States, State and local, as well as national, for the purpose of ascertaining whether the quarantine regulations prescribed by the Secretary of the Treasury have been, or are being, complied with. The Supervising Surgeon-General, or the officer detailed by him as inspector, shall, at his discretion, visit any incoming vessel, or any vessel detained in quarantine, and all portions of the quarantine establishment for the above-named purpose, and with a view to certifying, if need be, that the regulations have been, or are being, enforced.—J. G. CARLISLE, *Secretary*.

GENERAL INSTRUCTIONS.

A. Your inspections will include all ports within your district where vessels are allowed to enter and discharge cargo, and ports which may be used as ports of call.

B. A separate report will be made of each station visited.

C. Visit every part of the quarantine establishment, and take necessary precautions to prevent the conveyance of contagious or infectious disease through the medium of your own person.

D. Visit the custom-house for the purpose of ascertaining whether the regulations with regard to bills of health and quarantine certificates are being observed; also, the immigration station for any pertinent information.

E. Reports of a statistical character and descriptive of the quarantine, called for herein, need be made but once in every six months, namely, on the date nearest the 1st of January and the date nearest the 1st of July; but any changes that have been made since the last general report should be immediately recorded.

In making your report you will follow the special instructions in their order, referring to each by number.

SPECIAL INSTRUCTIONS.

1. Describe the quarantine station, location, buildings, anchorages, etc. Give limits of anchorage for non-infected and for infected vessels; facilities for inspection of vessels; apparatus for disinfection of vessels and of baggage; facilities for removal and treatment of the sick, and for the removal and detention of suspects; mail and telegraph facilities, etc.

2. Give *personnel* of the station or port; name of the quarantine officer or officers; post-office address; total number of officers and subordinates, etc.

3. Transmit copies of the laws under which the local quarantine is maintained, and copies of the quarantine regulations; also describe the quarantine customs of the port as they are carried out.

NOTE.—There are sometimes slight, but possibly important, variations from the letter of the local regulations in the administration of quarantine. Also, local regulations generally allow a wide latitude to the quarantine officer, and how this latitude is used—*i.e.*, how the quarantine officer interprets the spirit of the regulations—is very important.

4. State what quarantine procedures, either under printed regulations or by custom, are enforced at the port, in addition to the requirements of the Treasury Department.

It should also be stated whether there is undue or unnecessary detention or disinfection of vessels.

5. State whether the inspection is maintained throughout the year or for what period, and what *treatment* of vessels is enforced during the entire year.

NOTE.—Many ports on the South Atlantic coast (*e.g.*, Charleston, Savannah, and Fernandina) require certain ballasts to be discharged in quarantine without regard to season.

6. Are vessels from other United States ports inspected?

7. Describe quarantine procedures in the inspection of vessels, and, if infected, the treatment. Give time in quarantine (*a*) between arrival and commencement of disinfection, (*b*) time occupied by disinfection, and (*c*) time after completion of disinfection of vessels until discharge.

NOTE.—Quick or slow handling of a vessel is of more importance commercially than the question of fees. The time lost is the vessel's heaviest expense, generally.

8. What communication is held with vessels in quarantine (and, before quarantine, by pilots, etc.), and how regulated? Is there any intercommunication allowed among vessels in quarantine?

9. State what will be done with a vessel infected with cholera; second, a vessel infected with yellow fever; third, a vessel infected with small-pox (said vessels carrying or not carrying immigrants), and what

conditions are regarded as giving evidence of the vessel's infection in each case.

10. State whether records are kept, at the station, of the cases of disease that have occurred during the voyage, on arrival, and during detention.

11. Transmit schedule of quarantine fees, and give other fees and expenses necessarily and usually attendant on quarantine, as tonnage, ballast, wharfage charges, etc.

12. Make a statement showing the number of vessels arriving at the port during the preceding calendar year, by months, (a) from foreign ports; (b) from foreign ports in yellow-fever latitudes via domestic ports; (c) from domestic ports. Show, also, the character of the commerce carried on by the port,—i.e., from what countries chiefly the vessels come, and whether in cargo, ballast, or empty.

13. State results of your visit to (a) the Custom-house; (b) the Immigration Bureau.

14. State whether, in your opinion, the quarantine facilities are sufficient to care for the shipping entering the port.

15. Name the quarantine regulations of the Treasury Department which are not properly enforced, and state specifically whether the regulations regarding inspection and disinfection, and particularly the period of observation after disinfection, of vessels are observed.

16. Mention any facts which, in your opinion, should be known to the Department, bearing directly or indirectly upon the quarantine service, and make such recommendations as seem proper.—WALTER WYMAN, *Supervising Surgeon-General M.-H. S.*

NOTE.—Report to be written on legal-cap paper (on one side only), signed, and inclosed in this blank as a cover.

INLAND QUARANTINE.

Under Inland Quarantine will be described The Sanitary Cordon, Camps of Probation, Railroad Quarantine, Disinfection Stations, and Inspection Service.

THE SANITARY CORDON.

This consists of a line of guards, military or civil, thrown around a district or locality, either to protect the same from the surrounding country when infected, or to protect the surrounding country from the infected district or locality. When a given locality is infected, and the adjacent territory is regarded

as suspicious, it may be necessary to establish a double cordon, the first one embracing the whole suspected territory at its outer edge, the second investing more closely the well-defined infected locality. After the expiration of a sufficient time to prove that the area between the cordons is not infected, or has been cleared of infection, the first cordon may be removed. Hospitals and camps of probation may be necessary adjuncts to the cordon. The most noted example of the sanitary cordon is found in the history of the plague-epidemic in Russia in 1878. A colony on the river Volga, called Wetljankaja, with a population of 1700 inhabitants, became infected with the Oriental plague, which extended to the neighboring villages. A military cordon was made to embrace all the infected district. The inhabitants of the focus of infection, Wetljankaja, were removed, property appraised for re-imbursement by the government, and the village burned. An additional cordon was thrown around Zarizin, a neighboring commercial city of importance and terminus of the Russian railway system. The cordons were maintained several months, and the plague was stamped out. (See Abstract Sanitary Reports, vol. i [Bulletin's], page 78.) The sanitary cordon is the customary method of preventing the spread of epidemic disease in the eastern countries.

In the United States, when yellow fever prevailed in Pensacola, in 1882, to the extent of 2200 cases, the navy-yard reservation, whose boundary-line is within two miles of the city limit, and with a population of about 1500, was successfully guarded by means of a cordon and non-intercourse.

The following year, 1883, the navy-yard itself was infected, and a cordon was thrown around it to protect the city of Pensacola, and was maintained for a period of sixty days. This cordon was under the management of the Surgeon-General of the Marine-Hospital Service, aid having been requested of the national government. The Collector of Customs of Pensacola was made the agent to execute the orders of the Marine-Hospital Bureau, and to the President of the local Board of Health

was intrusted the immediate command of the line and guards. The cordon entirely surrounded the land-boundary of the naval reservation. Its line was four miles in length, one mile of it through a dense thicket, and was marked by blazed trees and flags. Forty men were employed as guards, an equal number being selected from each of the two political parties. Two captains were appointed, and were obliged to supervise the line night and day.

The sentinel posts were furnished with tents, and two guards were allotted to each post, taking alternate watches of four hours each. A detention or probation camp was established and placed in charge of a physician, where persons wishing to leave the reservation were obliged to pass a probationary period of twenty days. Not more than half a dozen persons were received in this camp. The government expended about \$20,000 in these restrictive measures, which were entirely successful. Not one person got through the cordon line. The success was due largely to the thorough discipline maintained by the Collector and the President of the Board of Health.

Yellow-Fever Cordon in Texas.—In 1882, yellow fever prevailing in Mexico, along the Rio Grande, and in Brownsville, Texas, a sanitary cordon was established by the Surgeon-General of the Marine-Hospital Service, on request of the Governor of the State, extending along the line of the railroad from Corpus Christi, on the Gulf of Mexico, inland to Laredo, on the Rio Grande. This line was one hundred and eighty miles northeast of Brownsville, the triangular territory thus hemmed in by the cordon on one side, the Rio Grande on another, and the Gulf on the third, being all suspected territory, although the fever prevailed in only one corner of it,—viz., in Brownsville. All persons were detained at least ten days at the cordon before being allowed to pass northward,—a period of probation to insure that no one having the disease should carry it farther north. As soon as practicable another cordon was established much nearer to Brownsville, only thirty

miles from it, the line extending from the mouth of the Sol Colorado, on the Gulf of Mexico, to Santa Maria, on the Rio Grande. After a time sufficient to prove that no more fever prevailed between the two cordons, the first one was removed. Within the second line, where the fever prevailed, chiefly in Brownsville, a hospital was established and dispensaries opened for the gratuitous treatment of all applicants.

Upon the Mexican side of the Rio Grande the fever continued to spread northwardly, and, in order to oppose it, still another cordon had to be established on the American side of the river, extending from Santa Maria on the south to Laredo on the north, a distance of five hundred miles. Three hundred guards, well mounted (Texan cow-boys), were employed in this cordon, and, while the disease was being stamped out in Brownsville, any further importation from Mexico was thus prevented. In Mexico the fever continued to spread until the authorities finally adopted measures similar to the above.

The epidemic of yellow fever in Brunswick, Ga., in 1893, gave rise to the necessity of establishing a sanitary cordon to protect the surrounding country from the danger incident to the panic-engendered flight of the inhabitants of that town. On account of the peculiar situation of Brunswick the difficulties to be met were very great. Not only were numerous roads to be guarded, but three water-passages from the city into the surrounding country had also to be watched. The cordon, therefore, partook of the nature of both a land and water patrol, and the difficulties were successfully overcome, and no well-authenticated instances of escape through the lines were established.

Much violent language has been used concerning the hardships imposed by the sanitary cordon, but in the presence of an epidemic the authorities who are responsible need to pay more heed to the efficiency of the cordon than to individual complaints. It should be borne in mind that the sanitary cordon is not intended to bottle up all the people who are

caught within an infected district. On the contrary, it is intended as a means of exit to those who will not carry with them contagious disease to the people beyond.

The cordon, then, imposes simply a period of detention corresponding to the incubative period of the prevailing disease. Ample preparation must be made for housing and feeding, in camps or other quarters, persons awaiting the expiration of the detention period; and hospitals must be provided for the treatment of those who develop sickness. Provision must also be made for the disinfection of suspected baggage.

CAMPS OF PROBATION.

Camps of probation or detention should be established with all the precision of arrangement and regard for site, water, and drainage that pertain to a military camp. Every effort should be made to make the camp as comfortable and cheerful as possible, and to this latter end amusements and entertainments such as might be suggested by the campers themselves should be encouraged. Every necessity in the matter of food, bedding, and the ordinary comforts of life should be anticipated, to prevent any just cause of complaint. Such a natural division of the inhabitants should be made as seems desirable at the time, those of equal intelligence and refinement naturally seeking each other's company. The greatest concern is to prevent the camp itself from becoming infected. To this end no baggage should be allowed within the camp-boundary without previous disinfection; and every refugee should be examined by a physician before being admitted to the camp. No one should be received who does not intend to proceed to an uninfected locality after his probation. In other words, a camp of probation should not be used as one of refuge.

The camp must be surrounded by guards to prevent egress or ingress, excepting through the established portal. At least twice or three times in the twenty-four hours all refugees should be inspected in their quarters, and any case of sickness at once

be isolated and watched until the diagnosis is certain. If the case is one of the prevailing disease, the patient must be removed immediately to the hospital, which should be at a safe distance, half a mile or more, from the camp. Before leaving the camp, each refugee's clothing should be fumigated, and he should be given a certificate that he has passed the required period of probation. A clear distinction must be made between camps of probation and camps of refuge. Camps of refuge are simply residence camps established to receive the population of an infected community when it has been determined to depopulate the infected district.

Depopulation of a house, a block, a district, or a whole city, if possible, the people moving into camps, is now recognized as a valuable means of controlling an epidemic; and there may be either camps of probation or simply camps of refuge, or both, according to the requirements of the situation. Camps of refuge, in connection with depopulation, were suggested by the late Surgeon-General Woodworth, in 1878, and the measure was practically carried out at Memphis, in 1879, by the establishment of Camp Mitchell. "But the establishment of a camp to which persons from infected points could go, be kept under observation a sufficient length of time to demonstrate they were not infected, have their baggage disinfected, and be given 'free pratique,' is apparently a new departure in inland quarantine."

Camp Perry, Fla.—Such was Camp Perry, Florida, described by the surgeon in charge, W. H. H. Hutton, in the Marine-Hospital Service Report for 1889. The site was admirably chosen by Passed Assistant Surgeon John Guit  ras, upon a bluff on the south side of St. Mary's River, the dividing line between Florida and Georgia, about forty miles north of Jacksonville, Fla., which city was in the throes of a yellow-fever epidemic. The camp was opened August 20, 1888. It consisted, in its completed stage, first, of 50 wooden cottages built elsewhere and transported on cars. Their dimensions were 12

feet by 10, and 10 feet in height, constructed of plain lumber, with cracks battened, and windows on each side with swinging shutters. Each held four cots, chairs, and toilet-stand, while unused clothing was neatly arranged on the rafters above. Besides the 50 cottages there were a quartermaster and guard-house, commissary building, dining-room and kitchen, and laundry, built of rough lumber; 2 Ducker portable barracks, each 18 by 35 feet, provided with 12 beds each, and 350 tents, used principally by the single men, the employés and guards, and the colored refugees. So far as known, this is the first camp of the kind ever established; at least, in the United States. The cottages were arranged in a quadrangle around a parade-ground two acres in extent, and the tents were arranged in streets and alleys in the rear of the cottages. The accommodations were sufficient for 600 people, and extra tents were on hand so that, if required, 1000 persons could have been provided for, or 3000 per month, allowing for only ten days' detention of each person. Two hundred hospital tents will accommodate 1200 people comfortably, according to Surgeon Hutton, who states that the small A-tents are unsuited for women and children, but will answer for men or boys. Wire-mattress cots should be provided. The marine-hospital officer at Savannah Ga., was the purchasing agent for the camp, and promptly forwarded all subsistence supplies on requisition by mail or telegraph.

Discipline of the Camp.—On arrival of a train, each passenger was personally examined by a physician, his health-certificate scrutinized, and he was made to await the examination of others. Hand-bags, clothing, and loose wearing-apparel were left in the baggage-car for disinfection. The refugees were then marched to the quartermaster's room for registration and assignment to quarters. On first arrival they were placed in the southern part of the camp, and in two days, there being no sickness, were moved forward several cabins, and this progression was repeated until the time for discharge.

Twelve guards were employed, under the command of a captain, and were divided into squads of four each. The schedule was so arranged that each guard was on duty two hours and off duty four.

A bugler announced the several calls, as follow :—

5.30 A.M.,	.	.	.	.	Reveille.
6.00 A.M.,	.	.	.	.	Breakfast, employés.
7.00 A.M.,	.	.	.	.	Breakfast, guests.
9.00 A.M.,	.	.	.	.	Surgeon's call and inspection.
12.00 M.,	.	.	.	.	Dinner, employés.
1.20 P.M.,	.	.	.	.	Dinner, guests.
4.30 P.M.,	.	.	.	.	Surgeon's call and inspection.
5.30 P.M.,	.	.	.	.	Supper, guests.
6.00 P.M.,	.	.	.	.	Supper, employés.
6.30 P.M.,	.	.	.	.	Retreat and change of guard.
9.00 P.M.,	.	.	.	.	Retiring taps.

The yellow-fever hospital camp, under the special charge of Dr. Faget, was located one-half mile from the probation camp. It consisted of 2 frame buildings, 2 hospital and 12 smaller tents, arranged in a double-crescent shape, the avenue in the middle presenting an attractive appearance.

Of the 12 small tents, 4 were for nurses, 3 for employés, 2 for convalescents, and 1 each for drug-store, storage- and dead- house. One of the hospital tents was used as a dining-room for employés, convalescents, and parents of the sick.

The hospital was established September 3, 1888, and between that date and November 24th 35 cases of yellow fever were admitted and treated, 3 died, and 32 were discharged. Twelve hundred and eleven refugees were received into Camp Perry, nearly all of whom were from the infected district of Jacksonville.

Thirty-five cases of yellow fever were caught by the ten days' detention, but no case of fever was contracted at the camp, and of the 1208 refugees who passed the required detention and proceeded to different parts of the country, so far as known, not one subsequently developed or carried the disease elsewhere.

The general plan of the preventive measures adopted during this epidemic will be described under Railroad Quarantine.

Detention Camp, Waynesville, Ga.—The epidemic of yellow fever in Brunswick, Ga., in 1893, caused the establishment of another camp of probation near Waynesville, Ga. Following is the report of the medical officer in command:—

SIR: I have the honor to present the following report of the operations of the detention camp near Waynesville, Ga.

The camp was officially opened for the reception of refugees from Brunswick, Ga., on the 18th of September, 1893, and closed by the order of Surgeon R. D. Murray, Marine-Hospital Service, permitting the return of all refugees to their homes in Brunswick, November 30, 1893.

Four hundred and thirty-one persons availed themselves of the privileges of the camp, of whom about two hundred and twenty-five were white and the remainder black and colored.

The site of the camp was selected by Surgeon W. H. H. Hutton, and was twenty-three miles west of Brunswick, immediately upon and on the south side of the Brunswick and Western Railway, and upon an eminence about twenty-five feet above the level of the surrounding country, which is generally swampy, and within a mile of the margin of what is locally known as the Buffalo Swamp. As is usual in this section, the elevation was covered with a dense growth of yellow-pine, scrub-oak, and black-gum trees. The soil was a gray, sandy loam, overlying a stratum of yellow clay, and the natural drainage of the site in all directions was good.

On my arrival I found that, under the direction of Surgeon Hutton, an area of two hundred feet had been cleared of trees and undergrowth, and at the four corners of this square rough but substantial buildings had been erected, which were used, respectively, as kitchen, white and colored dining-rooms, guard-room, quartermaster's store-room, executive office, telegraph office, and commissary. A depot and baggage-room were provided at the railway. Along the lines connecting these buildings, at intervals of twelve feet, were placed wall-tents, twelve by fourteen feet, with flies, and subsequently further rows of tents were pitched behind these and opening on streets fourteen feet wide. All tents were provided with substantial floors raised six inches above the ground, and the following equipment was provided: For each inmate, one spring, wire-bottomed cot, one cotton mattress, one hair pillow, two sheets, one pillow-case, and, for each tent, two tin wash-bowls, two tin cups, and two wooden chairs. Remarkable ingenuity was displayed by the

inmates in the construction of articles of furniture from packing-cases, waste lumber, etc. The tents proved of good quality in service, and quite comfortable in all weather. It is suggested, however, that any future tents be constructed with a wall two feet higher and of one foot greater pitch. A hospital establishment of two buildings was provided at a distance of one-half mile from the camp. A lofty pine-tree was fitted with a topmast, and served as a staff for the display of the national colors from sunrise to sunset each day.

The following routine was observed, the calls being given by the bugle:—

5.30 A.M.,	.	.	.	Reveille and attendants' breakfast.
6.00 A.M.,	.	.	.	Breakfast.
8.00 A.M.,	.	.	.	Sick call.
12.00 M.,	.	.	.	Dinner.
4.00 P.M.,	.	.	.	Sick call.
5.00 P.M.,	.	.	.	Supper.
Sunset,	.	.	.	Retreat and call to quarters.
9.00 P.M.,	.	.	.	Tattoo.
9.15 P.M.,	.	.	.	Taps (extinguish lights).

The meals were substantial, abundant, and as varied as possible. In all cases women and children were served at the first table, and the races were served in separate dining-rooms.

The following rules were announced, and seemed to work well in practice:—

1. At reveille all inmates will rise and prepare for breakfast.
2. All quarters must be clean, floors swept, and beds made up before first sick call.
3. Meals will be served in the dining-rooms only, and at stated hours, and no meals shall be carried from the dining-rooms to any quarters, except upon the written order of the medical officer, renewed from day to day.
4. At sick calls all inmates will repair to their quarters, and be there visited and inspected by the medical officer, who will prescribe or advise as he may deem best.
5. All suspicious cases of disease will be isolated at once, and until such time as the nature of the same may be determined.
6. All cases of infectious disease will be treated only in the hospital provided for the purpose.
7. No baggage from infected localities shall be brought into camp until disinfected by such process as may be directed, and only such wearing-apparel as may be deemed absolutely necessary will be brought into camp after the disinfecting process.

8. All wearing-apparel shall be a second time disinfected before discharge from camp.

9. Any person taken ill between two sick calls shall at once notify the nearest guard, who will, in turn, at once notify the medical officer.

10. Guards are enjoined by their vigilance to prevent the commission of any nuisance near any quarters; should such nuisance be discovered, the inmates of the nearest quarters will be required to police the same under the supervision of the guard, who will make report of the same.

11. Inmates will confine themselves to the inner lines of the camp after retreat (sunset) call.

12. While innocent enjoyment will be encouraged, the strictest propriety of conduct will be demanded and enforced.

The discipline of the camp was, in the main, good throughout. But two confinements for misbehavior were required during the entire duration of the camp.

All baggage was submitted to steam disinfection upon arrival at and departure from camp. The apparatus used was devised by Surgeon H. R. Carter, Marine-Hospital Service, and was constructed in a baggage-car, the steam being supplied by a locomotive.

In addition to other duties, nearly sixteen hundred cars, boxes, and flats were disinfected for the B. and W. Railway, sulphur fumigation being used for the boxes and drenching with acid solution of bichloride of mercury (1 to 800) for flat cars. This disinfection of cars enabled the traffic into Brunswick to be carried on with a minimum of delay and hardship.

Two cases of yellow fever occurred among the inmates of the camp, one resulting in recovery, one in death. Both cases occurred in the persons of sailors who had arrived in Brunswick on vessels trading there, and both would seem to show a period of incubation of at least five days, thus justifying our detention of ten days.

Recommendations.—Experience having shown certain things to be desirable, I would respectfully recommend:—

1st. That a disinfecting car be built and kept equipped for service in epidemics.

The nine-foot chamber built by the Kensington Engine-Works of Philadelphia for this Service might be easily erected on a specially-constructed car, and would prove more efficient in practice than extemporized apparatus. Another car might be fitted with apparatus for sulphur and bichloride-of-mercury disinfection, and a tank-car similar to those used for the transportation of petroleum would complete a train that

would be always ready for emergencies in any part of the country. Steam could be supplied by a locomotive hired for the purpose.

2d. That while experience has demonstrated the usefulness of tents, those provided in the future should be higher in the pitch and the wall, and that some provision be made for heating in severe weather. It is a question in my mind whether the Sibley conical tent, made with a higher wall, would not be preferable, on this account, to the square tent.

3d. That in future epidemics of yellow fever apparatus be provided for observations into temperature, temperature maximum and minimum, barometric pressure, dew-point, direction and velocity of the wind, precipitation, and ozone.

4th. That apparatus, instruments, and reagents be provided for investigation into the etiology of yellow fever in future epidemics.

Very respectfully,

(Signed)

H. D. GEDDINGS,

P. A. Surgeon M.-H. S.

To the Supervising Surgeon-General Marine-Hospital Service.

RAILROAD QUARANTINE AND INSPECTION SERVICE.

Railroad quarantine and inspection service may be described by a brief account of the actual measures of this nature made use of during the yellow-fever epidemic in Florida, in 1888, of which Camp Perry, just described, was an important adjunct. (For details, see annual reports Marine-Hospital Service, 1888 and 1889.)

The Governor of Florida made application to the national authorities, July 16th, for aid, and it was determined to prevent further spread of the disease by disinfecting all baggage from infected localities before permitting its transportation into other States, and by enforcing, upon all persons from infected localities seeking to leave the State, a probationary detention of ten days.

Accordingly, disinfection stations were established at two points, through which all persons leaving Florida by rail were obliged to pass. One of these was at Live Oak, in Northwestern Florida; the other at Way Cross, Georgia, near the boundary-line of Northeastern Florida. The only other means of egress from the State was from the sea-ports; but healthy sea-ports maintained a vigorous quarantine against people from

the infected districts, and infected sea-ports were not visited by the steam-ship lines, because their vessels would thereby be made liable to quarantine detention at other ports. The fumigation of baggage at Live Oak and Way Cross was accomplished by means of box-cars specially prepared, and subsequently in warehouses, the agent being sulphur dioxide.

Regarding persons, the inspectors, properly uniformed and wearing official shields, boarded the trains when the latter arrived at the inspection stations, and demanded of each passenger a certificate, showing where he had been during the previous ten days, which certificate was considered valid only when it bore the seal or signature of some officer of health, or recognized municipal authority. The inspectors themselves were kept informed regarding all infected or suspected localities, and a person coming from such locality was either made to return to it or given the option of going to the camp of probation, there to spend the ten days' period of probation before being allowed to enter other States.

This was Camp Perry, previously described, located 38 miles south of the Way Cross Station, and 40 miles north of Jacksonville, where the epidemic prevailed chiefly. All egress from Jacksonville was, perforce, through Camp Perry and its ten days' probation.

This camp was a means of protecting not only other States, but the uninfected portions of Florida itself, more particularly Southern Florida, whose health authorities refused to admit within their limits the refugees from the infected districts unless they had passed the period of probation at Camp Perry. To assist in this protection to Southern Florida, no person was allowed to board a south-bound train between Way Cross, on the north, and Orange Park, a station 20 miles south of Jacksonville.

Moreover, through south-bound trains were boarded at Way Cross, and all passengers compelled to furnish evidence of coming from healthful localities. The evidence consisted of

certificates from local authorities, baggage-checks, or railroad-tickets showing they were purchased in the North, and in some instances letters showing by the superscription and stamps where the person had been.

No train, excepting the special government train, was allowed to stop at Camp Perry. A government train also carried those who had passed the period of probation from Camp Perry to a point $3\frac{1}{2}$ miles distant, Folkstone, where they were transferred to a regular train running as far north as Way Cross, Ga., where another transfer had to be made to a regular north-bound train. No Florida passenger-car was allowed to go north, and more than 1000 baggage- and freight- cars were disinfected by government officers before being allowed to leave the State.

Train-Inspection Service during the Brunswick Epidemic.
—During the Brunswick epidemic the following regulations for the inspection of trains were promulgated and enforced:—

Inspectors will allow none to board a train, unless with a certificate, between Way Cross and Savannah.

If certificate can be examined before boarding, without detention to train, it must be done, and those which are unsatisfactory will not be allowed to board.

After boarding, the certificate and the person must be carefully examined and the inspector assure himself that the passenger is not recently from Jesup or any infected locality.

If the passenger is known to be a recent resident of Jesup or any infected locality, or to have been in such place during the past two (2) weeks, he will not be allowed to board, even if he has a certificate.

If, after boarding, either the certificate or the examination of passengers is not satisfactory, the passenger will be turned over to the city authorities at Way Cross or Savannah, or at the place where he desires to stop. If between these places, the facts to be noted and reported.

A record will be kept of the names of all passengers inspected, name of signer of certificate and his rank, date of inspection, date of certificate, and place of boarding train; and where passenger is bound and what disposition is made of him, whether passed or turned over to local authorities; also any other facts worth notice.

Inspectors will aid local quarantine authorities in any way in their

power consistent with their duties, and give them any information, obeying all local quarantine regulations. Inspectors report to Surgeon Carter, United States Marine-Hospital Service, or A. P. English, M.D.

Rules Adopted by Montgomery Conference for Railroad Quarantine.—The following are the rules for railroad quarantine adopted by the Quarantine Conference held in Montgomery, Ala., March 5 to 7, 1889:—

1. Quarantine should not be made against any place until it is officially known that yellow fever or other infectious or contagious disease exists at such place.

2. Only competent physicians should be put in charge of quarantine stations, and only thoroughly-qualified persons should be employed as inspectors on railway-trains.

3. Quarantine stations located on railroads should be established at convenient points, on one or both sides of a town or station, as may be deemed necessary.

4. If an epidemic of yellow fever or other infectious or contagious disease exist at a town or station, trains carrying passengers or freight should be required to pass through the limits of such towns or stations at a speed of not less than ten miles per hour, without stopping at such towns or stations, but should stop at the quarantine station.

5. Passengers to or from such infected point should only be received or delivered at the quarantine station, under the supervision of the quarantine officer in charge of the station.

6. Railway-tickets may be sold to persons leaving an infected place to any point willing to receive them.

7. All baggage from any infected point should be properly disinfected.

8. As far as practicable, the same rules proposed for railroads should be applied to vessels of every kind, stage-coaches, or other means of travel.

9. The passage of railroad-trains through any point on the line of road, whether infected or not, should not be prohibited by any quarantine regulations. The conductors of passenger-trains should close the windows and ventilators and lock the doors of cars passing through any place where a train is not permitted to stop.

10. All freight to any infected place should be delivered either at the quarantine station or the nearest railway-station to such infected point where it can be properly cared for.

11. All mail-matter from any infected place should be properly disinfected by the United States Government; and mail-matter intended for infected points should be put off the trains at the quarantine stations. The United States Government should instruct postmasters to receive and deliver mails at such quarantine stations.

12. Railroads and express companies may receive for transportation from any infected place, during the time such infection exists, any merchandise or traffic consigned to places willing to receive it.

13. State authorities should employ competent persons on passenger-trains as inspectors of passengers, baggage, and express matter, as additional precaution; but the fact of inspectors being on such trains should not relieve trains carrying passengers or express matter or baggage from stopping at quarantine stations for such inspection as the officer in charge may determine to be necessary.

14. It is recommended that all quarantines, as far as practicable, should be uniform in their requirements and operations, which will greatly contribute to the prevention of panics, and tend to allay unnecessary excitement and fear on the part of the people.

15. The form of health certificate adopted by the Quarantine Convention held at Montgomery, March 5, 1889, should be prepared for health officers to issue to such persons as may be found entitled to receive the same. A copy of this certificate should be printed with these rules, and conspicuously posted at railway-stations.

16. It is the desire and intention of health authorities, as far as practicable, to throw every safeguard around the public health of all localities. Municipal, county, and State authorities are expected to co-operate in every possible way with health officers located in towns, villages, and cities, and in charge of quarantine stations, to enable them to prevent the introduction or spread of yellow fever or other infectious or contagious diseases.

It was also resolved by this conference that the best form of disinfectant for personal baggage is moist heat.

The methods of railroad quarantine may also be studied in a review of the action taken to prevent the introduction of small-pox into the United States from Canada, where it prevailed extensively in the fall and winter of 1885, and January and February, 1886.

The following regulations were issued by the Surgeon-General of the Marine-Hospital Service, October 10, 1885:—

The act approved April 29, 1878, entitled "An act to prevent the introduction of contagious or infectious diseases into the United States," provides that no vessel or vehicle coming from any foreign port or country where any contagious or infectious disease exists, or any vessel or vehicle conveying persons, merchandise, or animals affected with any contagious disease, shall enter any port of the United States, or pass the boundary-line between the United States and any foreign country, except in such manner as may be prescribed under said act.

Attention is now directed to the prevalence of the contagious and infectious disease of small-pox in Montreal and other places in the Dominion of Canada, and the law referred to is held to apply alike to trains of cars and other vehicles crossing the border, and to vessels entering ports on the northern frontier.

Because, therefore, of the danger which attaches to the transportation of persons and baggage, and articles of merchandise, or animals, from the infected districts, the following regulations are framed, under the direction of the Secretary of the Treasury, and subject to the approval of the President, for the protection of the health of the people of the United States against the danger referred to:—

1. Until further orders all vessels arriving from ports in Canada, and trains of cars and other vehicles crossing the border-line, must be examined by a medical inspector of the Marine-Hospital Service before they will be allowed to enter the United States, unless provision shall have been made by State or municipal quarantine laws and regulations for such examination.

2. All persons arriving from Canada, by rail or otherwise, must be examined by such medical inspector before they will be allowed to enter the United States, unless provision has been made for such examination.

3. All persons coming from infected districts, not giving satisfactory evidence of protection against small-pox, will be prohibited from proceeding into the United States until after such period as the medical inspector, the local quarantine, or other sanitary officer duly authorized, may direct.

4. The inspectors will vaccinate all unprotected persons, who desire or are willing to submit to vaccination, free of charge. Any such person refusing to be vaccinated shall be prevented from entering the United States.

5. All baggage, clothing, and other effects, and articles of merchandise, coming from infected districts, and liable to carry infection, or suspected of being infected, will be subjected to thorough disinfection.

6. All persons showing evidence of having had small-pox or varioloid, or who exhibit a well-defined mark of recent vaccination, may be

considered protected ; but the wearing-apparel and baggage of such protected persons who may come from infected districts, or have been exposed to infection, will be subjected to thorough disinfection as provided.

7. Customs officers and United States medical inspectors will consult and act in conjunction with authorized State and local health authorities so far as may be practicable, and unnecessary detention of trains or other vehicles, persons, animals, baggage, or merchandise, will be avoided so far as may be consistent with the prevention of the introduction of diseases dangerous to the public health into the United States.

8. Inspectors will make full weekly reports of services performed under this regulation.

9. As provided in Section 5 of said act, all quarantine officers or agents acting under any State or municipal system, upon the application of the respective State or municipal authorities, are empowered to enforce the provisions of these regulations, and are hereby authorized to prevent the entrance into the United States of any vessel or vehicle, person, merchandise, or animals prohibited under the act aforesaid.

10. In the enforcement of these regulations there shall be no interference with any quarantine laws or regulations existing under or to be provided for by any State or municipal authority.

The following are the special instructions for the guidance of sanitary inspectors, issued by Surgeon H. W. Austin, in charge of the inspection service on the Canadian frontier from Buffalo, N. Y., to the Atlantic coast during the epidemic above referred to (see Marine-Hospital Report, 1886):—

REGULATIONS FOR SANITARY INSPECTORS.

The following instructions will be observed by the sanitary inspector on the following-mentioned railroads crossing the United States boundary-line,—viz., the Grand Trunk Railway, at Rouse's Point, N. Y., and Island Pond, Vt.; the Passumpsic Railroad, at Newport, Vt.; the Central Vermont Railroad, at Highgate Springs or Saint Albans; the Canada Atlantic, at Rouse's Point, N. Y., and the Southeastern Railway, at Richford, Vt.:—

All persons bound for the United States coming from Montreal, or other places in Canada where small-pox prevails, must produce satisfactory evidence to the inspector that they are protected by a recent vaccination, or submit to this operation before they are allowed to cross the boundary-line.

Inspectors will vaccinate all unprotected persons free of charge.

Persons coming from Montreal, or suburban villages, will be carefully questioned as to their residence, whether small-pox has occurred in their families, or whether they have been in contact with the disease.

Inquiries should also be made relative to their baggage, whether it consists of bedding, household goods, etc., likely to be infected; and if any person or article of baggage is considered by the inspector infected or likely to introduce the disease into the country, he or it should not be permitted to cross the line into the United States.

You may consider persons protected who may show evidence of having had the small-pox or varioloid, or who exhibit a well-defined mark of vaccination. Accept as evidence of protection a certificate from any physician in good standing that the person presenting the same has been successfully vaccinated. Should you doubt the validity or authenticity of the certificate, you may refuse any such person presenting the same the privilege of crossing the border unless he submits to vaccination. Baggage known to have come from any infected district, and believed to be infected, will be thoroughly fumigated with sulphur at Rouse's Point, Saint Albans, Richford, Newport, and Island Pond.

Weekly reports should be made to Surgeon H. W. Austin, United States Marine-Hospital Service, Burlington, Vt., of the number of trains inspected, number of persons examined, number of persons vaccinated, number of pieces of baggage fumigated, and any other information relative to services performed by the inspector.

It will be observed that all the railroads, five in number, over which passengers or freight might be brought direct from Canada into the New England States, were guarded.

Besides the line commanded by Surgeon Austin (Atlantic coast to Buffalo), another line was under the direction of Passed Assistant Surgeon Wheeler, at points east of Buffalo, and still another on the Michigan frontier, under command of Surgeon W. H. Long. These lines were established at the request and with the co-operation of the authorities of the respective States. Thirty-six inspectors were employed at 37 stations, who examined 49,631 persons on railroad-trains, vaccinated 16,547, and detained or sent back 603. The contents of more than 7000 pieces of baggage were disinfected. The measures taken were successful.

In 1893, at a time when there was imminent danger that cholera might be introduced into the sea-board cities of the United States and carried by immigrants to the far West and the interior cities and towns, a most carefully formulated plan of railroad medical inspection of immigrants was drawn up; and while it was, fortunately, never necessary to carry out the provisions made at the time, the following regulations will well show the scope and general design of the protective and restrictive measures contemplated:—

RAILROAD MEDICAL INSPECTION OF IMMIGRANTS.

TREASURY DEPARTMENT,
Office of the Supervising Surgeon-General United States
Marine-Hospital Service,

WASHINGTON, August 23, 1893.

Instructions for the Guidance of Medical Officers of the Marine-Hospital Service, Sanitary Inspectors, and others concerned.

1. One or more medical inspectors shall accompany immigrants from the point of departure of each immigrant train, and shall immediately commence making a careful inspection of every passenger—man, woman, and child—upon the train. This inspection shall consist in identifying each passenger with the health card or cards he or she may hold, and satisfying himself as to the health of each person at the time of said inspection. He shall pass through the train once every hour or oftener, if he has reason to believe any person is suffering with diarrhœa or other symptoms of cholera.

2. The railroad companies will be expected to furnish earth-closets, which should be used, and the regular closets of the car are to be locked. These earth-closets shall be destroyed, before the train reaches its destination, at such points as the railroad officials shall designate. It shall be the duty of the inspector to see that the earth-closets are kept clean and frequently disinfected, and the cars properly ventilated and free from all offensive odors and dirt.

3. He shall, upon the least suspicion of cholera among the immigrants, have the suspected person or persons immediately removed to the hospital car at the rear of the train, disinfect all ejecta, and take every precaution possible to prevent the spread of the disease among the passengers by thoroughly disinfecting that portion of the car occupied by the suspects, the simplest means for this purpose being a solution of bichloride of mercury in the proportion of 1 to 800.

4. The inspectors will at once notify the conductor of the train upon the first appearance of a suspicious case, in order that the hospital car may be switched off at the first designated switch, and the health officer of the county in which said switch is located be immediately notified to take charge of this car.

5. It is expected that the railroads will furnish a car for hospital purposes, in which the seats can be readily converted into beds suitable for the care of the sick. The necessary bedding will be furnished by the United States Marine-Hospital Service.

6. Disinfectants, consisting of packages of bichloride of mercury and an alkali, will be furnished the medical inspector in proper quantities for adding to a two-gallon wooden bucket of water; also a quantity of carbolic acid in solution and other approved disinfectants. Each hospital car shall be equipped with a dozen two-gallon wooden buckets for holding disinfecting fluids, half a dozen mops, one or more hand force-pumps with rose sprinklers, one or more commodes and bed-pans, half a dozen eight-ounce hard-rubber syringes, half a dozen tumblers, one dozen rubber sheets, and one dozen feeding-cups for administering medicine. There shall also be furnished an oil-stove for heating water, and several tin boilers and tin cups.

7. *Medical supplies, etc.*, consisting of tannic acid, hydrarg. chloridum mite, tincture of opium, mustard or mustard papers, chloroform or ether sulph., whisky, brandy, and one or more hypodermatic syringes; also supply of Squibb's Diarrhœa Mixture for checking looseness of the bowels or premonitory diarrhœa.

WALTER WYMAN,
Supervising Surgeon-General.

INTERSTATE QUARANTINE.

The general principles governing interstate quarantine are the same as those pertaining to the maritime and foreign quarantines, with the exception that, instead of dealing with ships as the media of transportation, we must deal with trains on railroads, lines of stage-coaches, and steam-boats plying on the inland waters of the United States. The principles are almost sufficiently elaborated in the previous sections on train inspection in the case of yellow-fever epidemics, and the precautions which were under consideration for the prevention of the spread of cholera by means of emigrant trains.

An important matter is the one of notification. It will be

seen, by a study of the regulations for interstate quarantine which follow, that State and municipal health officers are requested to notify the Supervising Surgeon-General of the appearance of any of the quarantinable diseases in their States or localities, thus enabling appropriate measures to be taken to prevent their spread without the loss of valuable time, for time in the management of epidemics is of the utmost importance. Many an epidemic which has assumed vast proportions would, if recognized in time, have been capable of easy management and of being confined to the seat of its first outbreak. It is always comparatively easy to confront an open enemy; it is the insidious spread of disease, either unrecognized or concealed for reasons of business policy, that causes delay in the inception of preventive measures, and is most to be dreaded from a sanitary stand-point.

The following are the regulations prepared in the Marine-Hospital Bureau to prevent the introduction of contagious diseases into one State or Territory or the District of Columbia from another State or Territory or District of Columbia. It is expected that additional regulations will be promulgated from time to time as circumstances demand:—

INTERSTATE QUARANTINE.

ARTICLE I.—QUARANTINE DISEASES.

1. For the purpose of these regulations the quarantinable diseases are cholera (cholérine), yellow fever, small-pox, typhus fever, leprosy, and plague.

ARTICLE II.—NOTIFICATION.

1. State and municipal health officers should immediately notify the Supervising Surgeon-General of the United States Marine-Hospital Service, by telegraph or by letter, of the existence of any of the above-mentioned quarantinable diseases in their respective States or localities.

ARTICLE III.—GENERAL REGULATIONS.

1. Persons suffering from a quarantinable disease shall be isolated until no longer capable of transmitting the disease to others. Persons exposed to the infection of a quarantinable disease shall be isolated,

under observation, for such a period of time as may be necessary to demonstrate their freedom from the disease.

All articles pertaining to such persons, liable to convey infection, shall be disinfected as hereinafter provided.

2. The apartments occupied by persons suffering from quarantinable disease, and adjoining apartments, when deemed infected, together with articles therein, shall be disinfected upon the termination of the disease.

3. Communication shall not be held with the above-named persons and apartments, except under the direction of a duly-qualified officer.

4. All cases of quarantinable disease, and all cases suspected of belonging to this class, shall be at once reported by the physician in attendance to the proper authorities.

5. No common carrier shall accept for transportation any person suffering with a quarantinable disease, nor any infected article of clothing, bedding, or personal property.

Bodies of persons who have died from any of the said diseases shall not be transported save in hermetically-sealed coffins, and by the order of the State or local health officer.

6. In the event of the prevalence of small-pox, all persons exposed to the infection, who are not protected by vaccination or a previous attack of the disease, shall be at once vaccinated or isolated for a period of fourteen days.

7. During the prevalence of cholera, all the dejecta of cholera patients shall be at once disinfected, as hereinafter provided, to prevent possible contamination of the food- and water- supply.

ARTICLE IV.—YELLOW FEVER.

In addition to the foregoing regulations contained in Article I, the following special provisions are made with regard to the prevention of the introduction and spread of yellow fever :—

1. Localities infected with yellow fever, and localities contiguous thereto, should be depopulated as rapidly and as completely as possible, so far as the same can be safely done; persons from non-infected localities, and who have not been exposed to infection, being allowed to leave without detention. Those who have been exposed, or who came from infected localities, shall be required to undergo a period of detention and observation of ten days, from the date of last exposure, in a camp of probation or other designated place.

Clothing and other articles capable of conveying infection shall not be transported to non-infected localities without disinfection.

2. Persons who have been exposed may be permitted to proceed

without detention to places willing to receive them, and incapable of becoming infected, when arrangements have been perfected to the satisfaction of the proper health officer to insure their detention in said places for a period of ten days.

3. The suspects who are isolated under the provisions of paragraph 1, Article III, shall be kept free from all possibility of infection.

4. So far as possible the sick should be removed to a central location for treatment.

5. Buildings in which yellow fever has occurred, and localities believed to be infected with said disease, must be disinfected as thoroughly as possible.

6. As soon as the disease becomes epidemic, the railroad-trains carrying persons allowed to depart from the city or place infected with yellow fever shall be under medical supervision.

7. Common carriers from the infected districts, or believed to be carrying persons and effects capable of conveying infection, shall be subject to sanitary inspection, and such persons and effects shall not be allowed to proceed, except as provided for by paragraph 2.

8. At the close of an epidemic the houses where sickness has occurred, and the contents of the same, and houses and contents that are presumably infected, shall be disinfected as hereinafter prescribed.

ARTICLE V.—DISINFECTION.

For Cholera.

1. The dejecta and vomited matters of cholera patients shall be received into vessels containing an acid solution of bichloride of mercury (bichloride of mercury, 1 part; hydrochloric acid, 2 parts; water, 1000 parts) or other efficient germicidal agent.

2. All bedding, clothing, and wearing-apparel soiled by the discharges of cholera patients shall be disinfected by one or more of the following methods:—

(a) By complete immersion for thirty minutes in one of the above-named disinfecting solutions.

(b) By boiling for fifteen minutes, all articles to be completely submerged.

(c) By exposure to steam at a temperature of 100° to 102° C. for thirty minutes after such temperature is reached.

3. Any woodwork or furniture contaminated by cholera discharges shall be disinfected by thorough washing with a germicidal solution as provided in paragraph 1, Article V.

For Yellow Fever.

4. Apartments infected by occupancy of patients sick with yellow fever shall be disinfected by one or more of the following methods:—

(a) By thorough washing with one of the germicidal solutions mentioned. If apprehension is felt as to the poisonous effects of the mercury, the surfaces may, after two hours, be washed with clear water.

(b) Thorough washing with a 5-per-cent. solution of pure carbolic acid.

(c) By sulphur dioxide, twenty-four to forty-eight hours' exposure, the apartments to be rendered as air-tight as possible.

5. Bedding, wearing-apparel, carpets, hangings, and draperies infected by yellow fever shall be disinfected by one of the following methods:—

(a) By exposure to steam at a temperature of 100° to 102° C. for thirty minutes after such temperature is reached.

(b) By boiling for fifteen minutes, all articles to be completely submerged.

(c) By thorough saturation in a solution of bichloride of mercury, 1 to 1000, the articles being allowed to dry before washing.

Articles injured by steam (rubber, leather, containers, etc.), to the disinfection of which steam is inapplicable, shall be disinfected by thoroughly wetting all surfaces with (a) a solution of bichloride of mercury 1 to 800, or (b) a 5-per-cent. solution of carbolic acid, the articles being allowed to dry in the open air prior to being washed with water, or (c) by exposure to sulphur fumigation in an apartment air-tight, or as nearly so as possible.

For Small-pox.

6. Apartments infected by small-pox shall be disinfected by one or both of the following methods:—

(a) Exposure to sulphur dioxide for twenty-four to forty-eight hours.

(b) Washing with a solution of bichloride of mercury 1 to 1000, or a 5-per-cent. solution of pure carbolic acid.

7. Clothing, bedding, and articles of furniture exposed to the infection of small-pox shall be disinfected by one or more of the following methods:—

(a) Exposure to sulphur dioxide for twenty-four to forty-eight hours.

(b) Immersion in a solution of bichloride of mercury 1 to 1000, or a 5-per-cent. solution of pure carbolic acid.

(c) Exposure to steam at a temperature of 100° to 102° C. for thirty minutes after such temperature is reached.

(d) Boiling for fifteen minutes, the articles to be completely submerged.

For Typhus Fever.

8. Apartments infected by typhus fever shall be disinfected by one or both of the following methods:—

(a) Exposure to sulphur dioxide for twenty-four to forty-eight hours.

(b) Washing with a solution of bichloride of mercury 1 to 1000, or a 5-per-cent. solution of pure carbolic acid.

9. Clothing, bedding, and articles of furniture exposed to the infection of typhus fever, shall be disinfected by one or more of the following methods:—

(a) Exposure to sulphur dioxide for twenty-four to forty-eight hours.

(b) Immersion in a solution of bichloride of mercury 1 to 1000, or a 5-per-cent. solution of pure carbolic acid.

(c) Exposure to steam at a temperature of 100° to 102° C. for thirty minutes after such temperature is reached.

(d) Boiling for fifteen minutes, the articles to be completely submerged.

MUNICIPAL QUARANTINE.

It is now generally conceded that a small number of cases of certain ones of the quarantinable diseases may exist in a city of considerable size, without giving rise to serious apprehension, if intelligent and vigorous measures for the prevention of its spread are taken, and if scientific measures for the isolation of patients, the surveillance of those exposed to infection, and the disinfection of apartments and articles infected are carried out. It is regarded as very important that the sick should be removed to centrally-located hospital establishments for treatment, thus increasing ease of management and administration, and diminishing the number of foci of infection. The surveillance of those exposed to infection should, in general, be for a period of time equal to the usual period of incubation of the disease to which they have been exposed. In the case of small-pox it may be unnecessary at times to detain the suspects the full period of incubation, provided they are vaccinated and their clothing and

personal effects are rendered safe by efficient disinfection. They should, however, be kept under observation.

For the suppression of small-pox in cities in which it has made its appearance, and in which it threatens to become epidemic, the following suggestions, made by the health authorities of the Northwest, will undoubtedly prove of value:—

1. The city should be divided into districts containing not more than 10,000 people.

2. Each district should be placed under the supervision of a competent medical inspector with necessary assistants (*a*) to make a house-to-house inspection; (*b*) to successfully vaccinate, within the shortest possible time, all persons who have not been vaccinated during the outbreak, the first vaccination to be completed within seven days; (*c*) to properly disinfect all houses and their contents where small-pox occurs.

3. Necessary means and appliances for efficient disinfection of materials, premises, etc., should be provided as the exigencies of each district may require.

4. Each case of small-pox should be immediately removed to a suitably constructed and properly equipped and officered isolation hospital.

5. Except in extreme cold weather, hospital tents, as prescribed in the United States Army Regulations, floored and warmed, are preferable to the average hospital or private dwelling, and increase the chances of recovery of the patients. Cases of small-pox necessarily retained in their own homes should, with their attendants, be rigidly isolated during the period of danger, and physicians visiting such patients professionally should be subject to such regulations as may be prescribed by the local health officer.

6. Persons exposed to small-pox contagion should be immediately vaccinated and kept under observation for not less than fourteen days from time of last exposure.

7. It is the sense of this Conference that unless such measures are enforced, it will be necessary for neighboring cities and States to exclude all persons from such city who are not protected against small-pox by recent vaccination, and to require proper disinfection of all clothing, baggage, and merchandise capable of conveying small-pox infection.

The subject of municipal quarantine naturally suggests a subdivision of the subject, viz., domiciliary quarantine, or the exercise of restrictive measures against a particular house or part

of a house on account of the occurrence of a quarantinable disease within its limits. These can best be accomplished by the stationing of guards to see that none enter or leave the infected premises except those necessary to care for the sick, viz., physicians and nurses. All intercourse between the outside world and the house under quarantine should be carried on by messengers who should not be allowed to enter the premises, but who should report to the guards.

It would be most desirable that the physicians and nurses, on leaving the premises, should practice personal disinfection of hands, at least; though, of course, it would be better if, in addition to this, a change into sterile clothing were made prior to coming into contact with the public.

It goes without saying that the room of the patient should be absolutely closed to the ingress of all save the physicians and nurses, and it is a practice of considerable value to provide all room-openings with curtains or hangings, which are to be kept constantly wet with a germicidal solution. The dejecta, vomited matter, and sputum should be promptly disinfected according to circumstances. When the disease has terminated, the house or apartments are to be thoroughly disinfected by one of the methods prescribed in the regulations, the method chosen being adapted to the disease which has prevailed. For the purposes of municipal disinfection the Marine-Hospital Service has had constructed portable apparatus for the use of steam and sulphur, which are, in effect, the same apparatus as have been previously described in this article, modified to meet their special requirements.

An important factor in the measures taken to suppress any epidemic disease is a house-to-house inspection, to ascertain the actual number of cases existing. Whether this inspection should include the whole city, or only the infected district, is a matter for the exercise of judgment; but, when required, the inspections should be made at intervals corresponding with the usual periods of incubation of the disease under observation.

A very important field for the exercise of municipal and domiciliary quarantine is furnished by those contagious and infectious diseases which, while causing large mortality, seldom prevail in epidemic form, viz., measles, scarlet fever, diphtheria, and tuberculosis.

MEASLES.

Measles may be dismissed with a few words. The course of the disease, uncomplicated, is usually so benign, especially in children, that all that is necessary is isolation. At the conclusion of the case or cases the apartment should be well aired, and it may be advisable to subject the room and the contents, bedding, and clothing to fumigation by sulphur.

DIPHTHERIA AND SCARLET FEVER.

With diphtheria and scarlet fever the conditions are far different. The diseases are virulent: the infection is subtle, and their spread very much to be dreaded. Vigorous effort alone can prevent their spread. Dwellings where the disease prevails must be placarded, special hospitals should be provided, and disinfection should be intelligently performed by competent municipal authority.

The regulations of the Board of Health of the District of Columbia are given here, as embodying the most recent practice in the management of these diseases:—

REGULATIONS TO PREVENT THE SPREAD OF DIPHTHERIA AND SCARLET FEVER.

The following regulations, provided for in the Act of Congress approved December 20, 1890, are promulgated for the information of all concerned:

The act referred to provides, in Section 2, "That it shall be the duty of the health officer, in conjunction with the attending physician, to cause the premises to be properly disinfected, and to issue the necessary instructions for the isolation of the patient"; in Section 3, "That it shall be the duty of physicians, while in attendance upon cases of scarlet fever and diphtheria, to exercise such reasonable precautions to prevent the spread of the said diseases as may be prescribed by the

health officer of the District of Columbia in regulations"; in Section 6, "That the word 'regulations,' as herein used, shall be held to mean, also, rules, orders, and amendments."

The term "scarlet fever," as applied in the act, shall be held to include scarlatina, scarlet rash, and canker rash, and *each and every case* must be reported upon the forms provided.

Warning-signs shall remain displayed on houses, in cases of scarlet fever, for a period of not less than four weeks, and in cases of diphtheria for not less than three weeks from date of report to the health officer, and for a longer period, unless report of recovery by the physician in attendance has been made.

In cases of death, the warning-sign shall remain displayed upon premises for a period of not less than seven days, and longer, unless the health officer is satisfied that all proper means have been employed for prevention of the spread of the contagion.

It shall be the duty of the householder, in every case where a warning-sign has been displayed from the premises which he or she occupies, to report promptly the removal of such sign at any time within the periods given.

It shall be the like duty of the physician in attendance to make such report to the health officer of the removal of warning-signs, unless assured that the report has been made by some one from the premises where the disease is prevailing or has prevailed.

It shall be the duty of the physician in attendance to report, in every instance, on the forms provided, whether or not children in the family or other children in the same building attend school, and at what school-building or buildings.

Children shall not be permitted to return to school from infected premises, except upon presentation of the proper certificate from the health officer.

All persons suffering from either diphtheria or scarlet fever are to be isolated in rooms as far removed as possible from those occupied by other persons in the building, and upon the top floor, where it is practicable. No person, other than the physician in attendance, the examining official, and the nurse or nurses, shall be admitted to such room during the prevalence of the disease.

Every room occupied by a patient suffering from either diphtheria or scarlet fever shall be cleared of all needless clothing, carpets, drapery, and other materials likely to harbor the poisons of the disease.

Soiled bed- and body- linen shall be immediately placed in vessels of water containing a solution of bichloride of mercury, chloride of zinc, or other suitable disinfectant.

Excremental discharges from the patient shall be received in vessels of water containing such a solution, and all vessels used shall be kept scrupulously clean and thoroughly disinfected.

Discharges from the throat, nose, and mouth shall be received upon pieces of cloth, which must be immediately burned.

All persons recovering from either diphtheria or scarlet fever shall be considered *dangerous*, and shall not be permitted to associate with others, or to attend school, church, or any public assembly, until a certificate has been furnished by the health officer to the effect that they may go abroad without danger of disseminating the contagion.

It shall be the duty of the person in charge of the premises where a case of diphtheria or scarlet fever exists, to exercise all reasonable care in the prevention of the commingling of persons who come into contact with the patient, or any other persons, whereby the contagion might be disseminated.

The body of a person who has died from either diphtheria or scarlet fever shall be immediately disinfected and placed in a coffin, which shall be tightly closed, and shall not be taken to any church or place of public assembly, and shall be buried within forty-eight hours, unless otherwise ordered by the health officer.

No public funeral shall be held in a dwelling in which there is a case of either diphtheria or scarlet fever, nor in which a death from either of said diseases has recently occurred.

Immediately upon the recovery of a person who has been suffering from either diphtheria or scarlet fever, or upon the death of a person who has been so suffering, the room or rooms occupied shall be thoroughly disinfected by exposure for several hours to the fumes of chlorine gas, or of burning sulphur, and shall thereafter be thoroughly cleaned and exposed to currents of fresh air.

All clothing, bedding, carpets, and other textiles which have been exposed to the contagion of the disease shall be either burned, exposed to superheated steam, or thoroughly boiled.

No person shall interfere with or obstruct the entrance, inspection, and examination of any building or house, by the inspectors or officers of this department, when there has been reported the case of a person sick with either scarlet fever or diphtheria therein.

Diagnosis of Diphtheria.—For the more prompt and certain diagnosis of diphtheria, small wooden boxes are distributed to the various pharmacies in Washington, each box holding two glass tubes, one tube containing a small cotton swab, the other

containing solidified blood-serum as a culture medium. Each tube is sterilized and plugged with cotton. The following notice is inclosed in each box:—

DIRECTIONS FOR MAKING CULTURES IN SUSPECTED CASES OF DIPHTHERIA.

The patient should be placed in the best light attainable, and, if a child, properly held. In cases where it is possible to get a good view of the throat, depress the tongue and rub the cotton swab gently, but freely, against any visible pseudomembrane or exudate.¹

In other cases, including those in which the exudate is confined to the larynx, open the mouth and pass the swab back till it reaches the pharynx, and then rub it freely against the mucous membrane. Without laying the swab down, withdraw the cotton plug from the culture-tube, insert the swab, and rub that portion of it which has touched the exudate gently back and forth along the surface of the blood-serum. Then replace the swab in its own tube, plug both tubes, and send the whole outfit at once to the laboratory.

A report will be forwarded the following morning, by mail, or can be obtained by telephone.

TUBERCULOSIS.

With the discovery by Koch of the cause of tuberculosis, and the numerous researches made by him and other observers into the nature of the tuberculous poison, has grown the conviction, of late years, that tuberculosis, being communicable, is to a large extent preventable. The *bacillus tuberculosis* is the etiological factor of most importance in the spread of tuberculosis; it has been proved that it is contained in large numbers in the sputum of tuberculous patients, and that, unlike most micro-organisms, its vitality is not destroyed by drying. Therefore, with the careful disinfection or destruction of the expectoration of tuberculous patients, one most important factor in the dissemination of tuberculosis will be removed. In almost all large hospitals, at the present day, the practice obtains of either isolating the tuberculous patients or of segregating them in special wards or apartments. With a view of preventing the spread of tuberculosis, the Board of Health of New York City

¹ This should be done before any germicide has been applied, and, if this has been done, allow at least an hour to intervene before making the inoculation.

has issued in English, German, Hebrew, and Italian the following circular for popular instruction:—

Consumption is a disease which can be taken from others, and is not simply caused by colds. A cold may make it easier to take the disease. It is usually caused by germs which enter the body with the air breathed. The matter which consumptives cough or spit up contains these germs in great numbers; frequently millions are discharged in a single day. This matter, spit upon the floor, wall, or elsewhere, is apt to dry, become pulverized, and float in the air as dust. This dust contains the germs, and thus they enter the body with the air breathed. The breath of a consumptive does not contain the germs, and will not produce the disease. A well person catches the disease from a consumptive only by in some way taking the matter coughed up by the consumptive.

Consumption can often be cured if its nature is recognized early and proper means are taken for its treatment. In a majority of cases it is not a fatal disease.

It is not dangerous for other persons to live with a consumptive if the matter coughed up by the consumptive is at once destroyed. This matter should not be spit upon the floor, carpet, stove, wall, or street, or anywhere except into a cup kept for that purpose. The cup should contain water, so that the matter may not dry, and should be emptied into the closet at least twice a day, and carefully washed with hot water. Great care should be taken by a consumptive that his hands, face, and clothing do not become soiled with the matter coughed up. If they do become soiled, they should be at once washed with hot water and soap. When consumptives are away from home, the matter coughed up may be received on cloths, which should be at once burned on returning home. If handkerchiefs are used (worthless cloths which can be burned are far better), they should be boiled in water by themselves before being washed.

It is better for a consumptive to sleep alone, and his bed-clothing and personal clothing should be boiled and washed separately from the clothing belonging to other people.

Whenever a person is thought to be suffering from consumption, the name and address should be sent at once to the health department, on a postal card, with a statement of this fact. A medical inspector from the health department will then call and examine the person to see if he has consumption, providing he has no physician, and, if necessary, will give proper direction to prevent others from catching the disease.

Frequently a person suffering from consumption may not only

do his usual work without giving the disease to others, but may also get well, if the matter coughed up is properly destroyed.

Rooms that have been occupied by consumptives should be thoroughly cleaned, scrubbed, whitewashed, painted or papered before they are again occupied. Carpets, rugs, bedding, etc., from rooms which have been occupied by consumptives, should be disinfected. The health department should be notified, when they will be sent for, disinfected, and returned to the owner free of charge; or, if he so desire, they will be destroyed.

QUARANTINE LAWS OF THE UNITED STATES.

AN ACT granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service.

[Approved February 15, 1893.]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it shall be unlawful for any merchant ship or other vessel from any foreign port or place of [to] enter any port of the United States except in accordance with the provisions of this act and with such rules and regulations of State and municipal health authorities as may be made in pursuance of, or consistent with, this act; and any such vessel which shall enter, or attempt to enter, a port of the United States in violation thereof shall forfeit to the United States a sum, to be awarded in the discretion of the court, not exceeding five thousand dollars, which shall be a lien upon said vessel, to be recovered by proceedings in the proper district court of the United States. In all such proceedings the United States District Attorney for such district shall appear on behalf of the United States; and all such proceedings shall be conducted in accordance with the rules and laws governing cases of seizure of vessels for violation of the revenue laws of the United States.

SEC. 2. That any vessel at any foreign port clearing for any port or place in the United States shall be required to obtain from the consul, vice-consul, or other consular officer of the United States at the port of departure, or from the medical officer where such officer has been detailed by the President for that purpose, a bill of health, in duplicate, in the form prescribed by the Secretary of the Treasury, setting forth the sanitary history and condition of said vessel, and that it has in all respects complied with the rules and regulations in such cases prescribed for securing the best sanitary condition of the said vessel, its cargo, passengers, and crew; and said consular or medical officer is required, before granting such duplicate bill of health, to be satisfied that the matters and things therein stated are true; and for his services in that

behalf he shall be entitled to demand and receive such fees as shall by lawful regulation be allowed, to be accounted for as is required in other cases.

The President, in his discretion, is authorized to detail any medical officer of the government to serve in the office of the consul at any foreign port for the purpose of furnishing information and making the inspection and giving the bills of health hereinbefore mentioned. Any vessel clearing and sailing from any such port without such bill of health, and entering any port of the United States, shall forfeit to the United States not more than five thousand dollars, the amount to be determined by the court, which shall be a lien on the same, to be recovered by proceedings in the proper district court of the United States. In all such proceedings the United States District Attorney for such district shall appear on behalf of the United States; and all such proceedings shall be conducted in accordance with the rules and laws governing cases of seizure of vessels for violation of the revenue laws of the United States.

SEC. 3. That the Supervising Surgeon-General of the Marine-Hospital Service shall, immediately after this act takes effect, examine the quarantine regulations of all State and municipal boards of health, and shall, under the direction of the Secretary of the Treasury, co-operate with and aid State and municipal boards of health in the execution and enforcement of the rules and regulations of such boards and in the execution and enforcement of the rules and regulations made by the Secretary of the Treasury to prevent the introduction of contagious or infectious diseases into the United States from foreign countries, and into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia; and all rules and regulations made by the Secretary of the Treasury shall operate uniformly and in no manner discriminate against any port or place; and at such ports and places within the United States as have no quarantine regulations under State or municipal authority, where such regulations are, in the opinion of the Secretary of the Treasury, necessary to prevent the introduction of contagious or infectious diseases into the United States from foreign countries, or into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia, and at such ports and places within the United States where quarantine regulations exist under the authority of the State or municipality which, in the opinion of the Secretary of the Treasury, are not sufficient to prevent the introduction of such diseases into the United States, or into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia, the Secretary of

the Treasury shall, if in his judgment it is necessary and proper, make such additional rules and regulations as are necessary to prevent the introduction of such diseases into the United States from foreign countries, or into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia; and when said rules and regulations have been made they shall be promulgated by the Secretary of the Treasury and enforced by the sanitary authorities of the States and municipalities, where the State or municipal health authorities will undertake to execute and enforce them; but if the State or municipal authorities shall fail or refuse to enforce said rules and regulations, the President shall execute and enforce the same and adopt such measures as in his judgment shall be necessary to prevent the introduction or spread of such diseases, and may detail or appoint officers for that purpose. The Secretary of the Treasury shall make such rules and regulations as are necessary to be observed by vessels at the port of departure and on the voyage, where such vessels sail from any foreign port or place to any port or place in the United States, to secure the best sanitary condition of such vessel, her cargo, passengers, and crew; which shall be published and communicated to and enforced by the consular officers of the United States. None of the penalties herein imposed shall attach to any vessel or owner or officer thereof until a copy of this act, with the rules and regulations made in pursuance thereof, has been posted up in the office of the consul or other consular officer of the United States for ten days, in the port from which said vessel sailed; and the certificate of such consul or consular officer over his official signature shall be competent evidence of such posting in any court of the United States.

SEC. 4. That it shall be the duty of the Supervising Surgeon-General of the Marine-Hospital Service, under the direction of the Secretary of the Treasury, to perform all the duties in respect to quarantine and quarantine regulations which are provided for by this act, and to obtain information of the sanitary condition of foreign ports and places from which contagious and infectious diseases are or may be imported into the United States; and to this end the consular officer of the United States, at such ports and places as shall be designated by the Secretary of the Treasury, shall make to the Secretary of the Treasury weekly reports of the sanitary condition of the ports and places at which they are respectively stationed, according to such forms as the Secretary of the Treasury shall prescribe; and the Secretary of the Treasury shall also obtain, through all sources accessible, including State and municipal sanitary authorities throughout the United States, weekly reports of the sanitary condition of ports and places within the United States, and shall prepare, publish, and transmit to collectors of customs and to State and

municipal health officers and other sanitarians weekly abstracts of the consular sanitary reports and other pertinent information received by him; and shall also, as far as he may be able, by means of the voluntary co-operation of State and municipal authorities, of public associations, and private persons, procure information relating to the climatic and other conditions affecting the public health, and shall make an annual report of his operations to Congress, with such recommendations as he may deem important to the public interests.

SEC. 5. That the Secretary of the Treasury shall from time to time issue to the consular officers of the United States and to the medical officers serving at any foreign port, and otherwise make publicly known, the rules and regulations made by him, to be used and complied with by vessels in foreign ports, for securing the best sanitary condition of such vessels, their cargoes, passengers, and crew, before their departure for any port in the United States, and in the course of the voyage; and all such other rules and regulations as shall be observed in the inspection of the same on the arrival thereof at any quarantine station at the port of destination, and for the disinfection and isolation of the same, and the treatment of cargo and persons on board, so as to prevent the introduction of cholera, yellow fever, or other contagious or infectious diseases; and it shall not be lawful for any vessel to enter said port to discharge its cargo or land its passengers, except upon a certificate of the health officer at such quarantine station certifying that said rules and regulations have in all respects been observed and complied with, as well on his part as on the part of the said vessel and its master, in respect to the same and to its cargo, passengers, and crew; and the master of every such vessel shall produce and deliver to the collector of customs at said port of entry, together with the other papers of the vessel, the said bills of health required to be obtained at the port of departure and the certificate herein required to be obtained from the health officer at the port of entry; and that the bills of health herein prescribed shall be considered as part of the ship's papers, and when duly certified to by the proper consular officer or other officer of the United States, over his official signature and seal, shall be accepted as evidence of the statements therein contained in any court of the United States.

SEC. 6. That on the arrival of an infected vessel at any port not provided with proper facilities for treatment of the same, the Secretary of the Treasury may remand said vessel, at its own expense, to the nearest national or other quarantine station, where accommodations and appliances are provided for the necessary disinfection and treatment of the vessel, passengers, and cargo; and after treatment of any infected vessel at a national quarantine station, and after certificate shall have

been given by the United States quarantine officer at said station that the vessel, cargo, and passengers are each and all free from infectious disease, or danger of conveying the same, said vessel shall be admitted to entry to any port of the United States named within the certificate. But at any ports where sufficient quarantine provision has been made by State or local authorities the Secretary of the Treasury may direct vessels bound for said ports to undergo quarantine at said State or local station.

SEC. 7. That whenever it shall be shown to the satisfaction of the President that by reason of the existence of cholera or other infectious or contagious diseases in a foreign country there is serious danger of the introduction of the same into the United States, and that notwithstanding the quarantine defense this danger is so increased by the introduction of persons or property from such country that a suspension of the right to introduce the same is demanded in the interest of the public health, the President shall have power to prohibit, in whole or in part, the introduction of persons and property from such countries or places as he shall designate and for such period of time as he may deem necessary.

SEC. 8. That whenever the proper authorities of a State shall surrender to the United States the use of the buildings and disinfecting apparatus at a State quarantine station, the Secretary of the Treasury shall be authorized to receive them and to pay a reasonable compensation to the State for their use, if in his opinion they are necessary to the United States.

SEC. 9. That the act entitled "An act to prevent the introduction of infectious or contagious diseases into the United States, and to establish a national board of health," approved March 3, 1879, be, and the same is hereby, repealed. And the Secretary of the Treasury is directed to obtain possession of any property, furniture, books, paper or records belonging to the United States which are not in the possession of an officer of the United States under the Treasury Department which were formerly in the use of the National Board of Health or any officer or employé thereof.

REVISED STATUTES.

SEC. 4794. There shall be purchased or erected, under the orders of the President, suitable warehouses, with wharves and inclosures, where merchandise may be unladen and deposited, from any vessel which shall be subject to a quarantine or other restraint, pursuant to the health laws of any State, at such convenient places therein as the safety of the public revenue and the observance of such health laws may require.

SEC. 4795. Whenever the cargo of a vessel is unladen at some other place than the port of entry or delivery under the foregoing provisions, all the articles of such cargo shall be deposited at the risk of the parties concerned therein, in such public or other warehouses or inclosures as the collector shall designate, there to remain under the joint custody of such collector and of the owner, or master, or other person having charge of such vessel, until the same are entirely unladen or discharged, and until the articles so deposited may be safely removed without contravening such health laws. And when such removal is allowed, the collector having charge of such articles may grant permits to the respective owners or consignees, their factors or agents, to receive all merchandise which has been entered, and the duties accruing upon which have been paid, upon the payment by them of a reasonable rate of storage; which shall be fixed by the Secretary of the Treasury for all public warehouses and inclosures.

SEC. 4796. The Secretary of the Treasury is authorized, whenever a conformity to such quarantines and health laws requires it, and in respect to vessels subject thereto, to prolong the terms limited for the entry of the same, and the report or entry of their cargoes, and to vary or dispense with any other regulations applicable to such reports or entries. No part of the cargo of any vessel shall, however, in any case, be taken out or unladen therefrom, otherwise than is allowed by law, or according to the regulations hereinafter established.

SEC. 4797. Whenever, by the prevalence of any contagious or epidemic disease in or near the place by law established as the port of entry for any collection district, it becomes dangerous or inconvenient for the officers of the revenue employed therein to continue the discharge of their respective offices at such port, the Secretary of the Treasury, or, in his absence, the First Comptroller, may direct the removal of the officers of the revenue from such port to any other more convenient place, within, or as near as may be to, such collection district. And at such place such officers may exercise the same powers, and shall be liable to the same duties, according to existing circumstances, as in the port or district established by law. Public notice of any such removal shall be given as soon as may be. [See Sec. 1776.]

SEC. 4798. In case of the prevalence of a contagious or epidemic disease at the seat of government, the President may permit and direct the removal of any or all the public offices to such other place or places as he shall deem most safe and convenient for conducting the public business. [See Sec. 1776.]

SEC. 4799. Whenever, in the opinion of the Chief Justice, or, in case of his death or inability, of the Senior Associate Justice of the

Supreme Court, a contagious or epidemic sickness shall render it hazardous to hold the next stated session of the court at the seat of government, the Chief or such Associate Justice may issue his order to the Marshal of the Supreme Court, directing him to adjourn the next session of the court to such other place as such justice deems convenient. The marshal shall thereupon adjourn the court, by making publication thereof in one or more public papers printed at the seat of government from the time he shall receive such order until the time by law prescribed for commencing the session. The several circuit and district judges shall, respectively, under the same circumstances, have the same power, by the same means, to direct adjournments of the several circuit and district courts to some convenient place within their districts respectively. [See Sec. 1776.]

SEC. 4800. The judge of any district court, within whose district any contagious or epidemic disease shall at any time prevail, so as, in his opinion, to endanger the lives of persons confined in the prison of such district, in pursuance of any law of the United States, may direct the marshal to cause the persons so confined to be removed to the next adjacent prison where such disease does not prevail, there to be confined until they may safely be removed back to the place of their first confinement. Such removals shall be at the expense of the United States.

SEC. 4263. The master of any vessel employed in transporting passengers between the United States and Europe is authorized to maintain good discipline and such habits of cleanliness among the passengers as will tend to the preservation and promotion of health; and to that end he shall cause such regulations as he may adopt for this purpose to be posted up, before sailing, on board such vessel, in a place accessible to such passengers, and shall keep the same so posted up during the voyage. Such master shall cause the apartments occupied by such passengers to be kept at all times in a clean, healthy state; and the owners of every such vessel so employed are required to construct the decks and all parts of the apartments so that they can be thoroughly cleansed; and also to provide a safe, convenient privy or water-closet for the exclusive use of every one hundred such passengers. The master shall also, when the weather is such that the passengers cannot be mustered on deck with their bedding, and at such other times as he may deem necessary, cause the deck occupied by such passengers to be cleansed with chloride of lime or some other equally efficient disinfecting agent. And for each neglect or violation of any of the provisions of this section the master and owner of any such vessel shall be severally liable to the United States in a penalty of fifty dollars, to be recovered in any circuit or district court within the jurisdiction of which such vessel may arrive

or from which she is about to depart, or at any place where the owner or master may be found.

[Extract from Act of August 1, 1888.]

Whenever any person shall trespass upon the grounds belonging to any quarantine reservation, . . . such person, trespassing, . . . shall, upon conviction thereof, pay a fine of not more than three hundred dollars, or be sentenced to imprisonment for a period of not more than thirty days, or shall be punished by both fine and imprisonment, at the discretion of the court. And it shall be the duty of the United States Attorney, in the district where the misdemeanor shall have been committed, to take immediate cognizance of the offense, upon report made to him by any medical officer of the Marine-Hospital Service, or by any officer of the Customs Service, or by any State officer acting under authority of Section 5 of said act.

[Act of March 27, 1890.]

AN ACT to prevent the introduction of contagious diseases from one State to another and for the punishment of certain offenses.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That whenever it shall be made to appear to the satisfaction of the President that cholera, yellow fever, small-pox, or plague exists in any State or Territory, or in the District of Columbia, and that there is danger of the spread of such disease into other States, Territories, or the District of Columbia, he is hereby authorized to cause the Secretary of the Treasury to promulgate such rules and regulations as in his judgment may be necessary to prevent the spread of such disease from one State or Territory into another, or from any State or Territory into the District of Columbia, or from the District of Columbia into any State or Territory, and to employ such inspectors and other persons as may be necessary to execute such regulations to prevent the spread of such disease. The said rules and regulations shall be prepared by the Supervising Surgeon-General of the Marine-Hospital Service, under the direction of the Secretary of the Treasury. And any person who shall willfully violate any rule or regulation so made and promulgated shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by a fine of not more than five hundred dollars, or imprisonment for not more than two years, or both, in the discretion of the court.

SEC. 2. That any officer, or person acting as an officer, or agent of the United States at any quarantine station, or other person employed to aid in preventing the spread of such disease, who shall willfully violate any of the quarantine laws of the United States, or any of the

rules and regulations made and promulgated by the Secretary of the Treasury as provided for in Section 1 of this act, or any lawful order of his superior officer or officers, shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by a fine of not more than three hundred dollars, or imprisonment for not more than one year, or both, in the discretion of the court.

SEC. 3. That when any common carrier or officer, agent, or employé of any common carrier shall willfully violate any of the quarantine laws of the United States, or the rules and regulations made and promulgated as provided for in Section 1 of this act, such common carrier, officer, agent, or employé shall be deemed guilty of a misdemeanor, and shall, on conviction, be punished by a fine of not more than five hundred dollars, or imprisonment for not more than two years, or both, in the discretion of the court.